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В НАУЧНОМ, КУЛЬТУРНОМ
И ОБРАЗОВАТЕЛЬНОМ ПРОСТРАНСТВЕ:
НОВЫЕ ЦЕННОСТИ, ВЫЗОВЫ, ПЕРСПЕКТИВЫ**

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HUMAN ECOLOGY

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ESTIMATION OF THE INFLUENCE OF THE ENVIRONMENTAL FACTOR ON THE COST OF RESIDENTIAL REAL ESTATE IN ASTANA

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Annotation: The cost of real estate is formed by taking into account the aggregate of physical, economic, social and administrative factors. This article is devoted to the study of environmental factors from the position of their influence on the pricing of housing in the capital of Kazakhstan - the city of Astana. The cost of residential property is determined by many factors, such as type of housing, location, attractiveness, prestige, etc. Along with these factors, the cost of residential property is affected by the quality of the environment.

Key words: environmental factor, real estate value, pricing, Henderson diagram, correlation coefficient, pollution index.

The real estate market in Astana is the most expensive in Kazakhstan. Despite the fall in prices, which continues after a multiple devaluation of the national currency and devaluation of the tenge more than 2 times, the cost per square meter in Astana is 17% higher than the average republican cost [1]. For 3 years, the cost per square meter in Astana fell by 49.2% in American currency and by 13.1% in national currency (Fig. 1.). The need to derive prices in US dollars is dictated by the fact that the lion's share in the real estate market in Kazakhstan is carried out with the help of the American currency.



Fig.1 Dynamics of prices per square meter in Astana from 05.2014 to 05.2017

The assessment of the contribution of environmental quality to the value of real estate in Astana was carried out in two main stages:

1. Identify the correlation coefficient between the cost per square meter and the quality of the environment in the city's microdistricts.

2. Analysis of the relationship between the cost per square meter and the quality of the environment in the city districts.

The BCG diagram of B. Henderson [2] was used to represent the analysis. Data are presented in Fig. 2.

The results were divided into 5 categories:

- 1 category - groups C-I, D-1, D-II. This category is characterized by the highest values of the pollution index and the lowest values of the cost per square meter.

- 2nd category - groups D-III, D-IV, C-IV. This category is characterized by high values of pollution index and the highest cost per square meter.

- 3 category - groups B-IV, A-IV, A-III. This category is characterized by the minimum values of the pollution index and the highest cost per square meter.

- 4 category - groups A-I, A-II, B-I. This category is characterized by the lowest values of the pollution index and the lowest cost per square meter
- 5 category - groups B-II, C-II, C-III, C-IV. This category is characterized by average values of pollution index and cost per square meter.

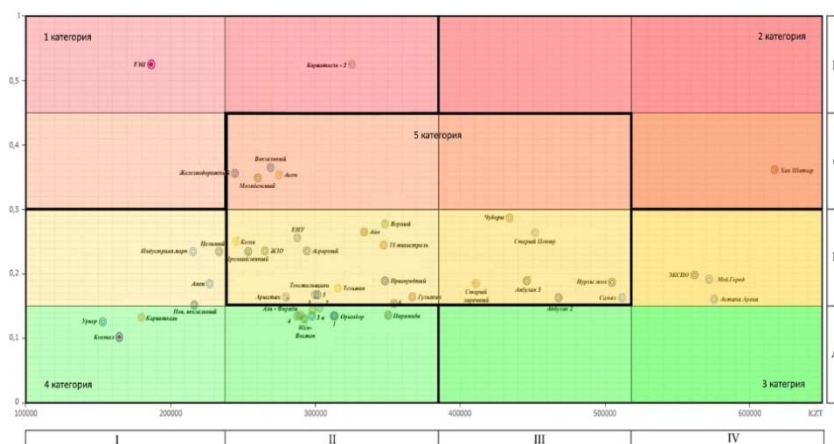


Fig. 2. Diagram of the relationship between pollution index and average cost per square meter in different microdistricts of Astana city

As the diagram shows, 2 microdistricts are referred to the 1st category, characterized by a high pollution index and a low price for apartments. These microdistricts are characterized by the presence of industrial facilities, which have a direct impact on the cost of housing and general attractiveness. The congestion of highways, because of the old layout, not intended for strong flows, is also one of the reasons.

1 microdistrict is assigned to the 2nd category, characterized by a high pollution index and high cost of apartments. The high index of the environmental load is due to the high density of automobile emissions, as this microdistrict is on the Left Bank, through which one of the city's main linear highways connecting the city passes. The high cost per square meter is due to the high prestige. In addition, there are many attractions of the city are located here. Thus, we can conclude that the environmental factor is underestimated here.

3 microdistricts are classified in the 3rd category, characterized by a low pollution index and a high price. The high cost per square

meter is due to the great prestige. So, the main vector of development of the city is directed along these microdistricts. The largest construction of important administrative centers of management, the creation of a powerful infrastructure, educational and scientific facilities, recreation and sports, make these areas one of the most attractive.

16 microdistricts – to the 4th category with low pollution and housing costs. These microdistricts are located in different parts of the city and are characterized by old infrastructure and lack of socially significant facilities. However, for the majority there is one connecting link, it is remoteness from the city.

26 microdistricts - to the 5th category, characterized by average values of pollution index and prices per square meter. The importance of the environmental factor for this category is difficult to distinguish. Since the pricing of residential real estate is affected by many factors.

Thus, it can be said that only in two categories (1 and 3), and this is only 5 microdistricts, the influence of the ecological state on the cost per square meter in Astana has been revealed.

Now, we can conclude that the environmental factor is not a priority in the pricing of the residential property of the capital. Therefore, only in 10.42% the state of the environment is adequate to the cost per square meter.

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«HOMO SAPIENS AND HOMO NEANDERTHALENSIS»
ANATOMICAL AND GENETIC EVIDENCE

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Abstract: For the last decades the close attention of paleoanthropologists has been directed towards the origin of African hominids. The history of human development is a difficult historical process, but at the same time it informs about how the ancestors of human adapted to a changing environment.

Key words: African hominids, concept of natural selection, Homo sapiens, Homo neanderthalensis, gene.

In recent decades, the interest of paleoanthropologists has turned to the last sixth million years by investigating the origins of African hominids. How have they adapted to changing and evolving environments? The human evolution, in fact, is a “long and complex” natural history and is an evolutionary historical process. In relation to this, Charles Darwin and Alfred Wallace, consider evolutionary biology related to the concept of natural selection. Darwin says that the population has been subjected in the past and now jet to a strong selection by environment, favor the best forms for survival and reproduction; so, the genetic composition of the populations can be changed over time allowing the evolution of the species. A very discussed argument, in the scientific area, concerns the evolution of Neanderthal man and if he is to be considered an extinct subtype of Homo sapiens or is an independent species.

Is there a possible cross between the two hominids or not? The paleoanthropologists have tried to answer this question by examining in detail the anatomical and genetic differences. But who is sapiens? And, who is Neanderthal?

Table 1. Anatomical features of sapiens and neanderthal

Sapiens presents: <ul style="list-style-type: none">• Short and round skull• Round occipital• High forehead• Not marked mandible• Skull capacity of 1450 ml	Neandethal presents: <ul style="list-style-type: none">• Flat and extended skull cap• Flat front• Necked occipital• Marked mandible• Skull capacity of 1600 ml
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These differences are given by the various adaptations. In an ecosystem, climate and resources are the basis of life, as well as the cause of variation and heterogeneity between species. In sight of this, two hypotheses have been proposed to explain the origin of anatomically modern Humans (*Homo sapiens*) and their relation to the so called “archaic” humans such as the Neanderthals (*Homo neanderthalensis*). [1]

One is the well known “out of Africa” or “recent replacement” theory; it says that *H. sapiens* evolved in Africa and migrated from there relatively recently, expanding over the world and displacing those archaic humans, such as the Neanderthals, who had evolved independently in Eurasia. An older hypothesis suggests that the evolution of modern Humans occurred in both Africa and Eurasia, with gene flow between the various populations; this is known as the “multiregional” model. [2] It is not easy to understand which is the most accredited theory because of the few fossil finds; the current hypothesis is that *H. sapiens* and *H. neanderthalensis* are different species but deriving from the same ancestral stock which is probably *Homo erectus* from which the two evolutionary lines are dichotomously separated, evolving in different ways and times. To confirm this there is a phylogenetic analysis of ancient DNA. [3-4]

In fact, a genome project was funded, in particular on mitochondrial DNA and which is inherited through the maternal line, has been a favored DNA sequence for determining relationships between human populations and there is a large amount of data on the mitochondrial DNA sequences present in humans of many different ethnic groups from all over the world. Other sequences are shorter but contain informative nucleotide positions. These mtDNA data indicate that all Neanderthal specimens sequenced up to now form a monophyletic lineage that split from the human lineage several hundred thousand years before population of modern humans began to diverge from each other. A skull fragment of a sample was analyzed (Neanderthal of Monte Lessini) as target was proposed a gene *MCPH1*, this is the microcephaline gene that is a critical regulator of the size of the brain. In humans, homozygosity for loss of function in this gene causes a condition known as primary microcephaly, characterized by a severe reduction in brain volume but also by a retention of the overall neuroarchitecture, without evident defects outside of the brain.

Microcephalin has been proposed as the target of positive selection in the evolutionary lineage leading from ancestral primates to humans. This gene was amplified by PCR technique and was cloned and sequenced. The presence of a specific haplotype of microcephaline in Neanderthal would be a good test of mixing between the two human forms, but the scientific data at present has not confirmed any mixing. However, the contamination is a serious problem in ancient DNA studies, especially human-like samples such as Neanderthals are analyzed. Usually, post mortem biochemical processes, such as strand fragmentation by hydrolysis, precludes or limits the analysis of DNA in ancient extracts. Another gene was examined, the MC1R which regulates pigmentation in humans and vertebrates, when this gene has a reduced function it favors a pale skin color and a red hair pigmentation. [5] MC1R is a good priori candidate for adaptive introgression. It is thought that light skin is favored in Europe as a compromise between the need for vitamin D synthesis and the need to prevent folate photolysis, both caused by UV radiation. [6-7] A fragment of the gene was amplified and sequenced by two remains of Neanderthal, one from Monte Lessini and one from El Sidron (Spain). A mutation was found in many Neanderthal samples but not in Sapiens, this fragment is, in fact, an endogenous sequence of Neanderthal. Molecular and genetic analysis does not confirm any gene flow between *H. neanderthalensis* and *H. sapiens* but supports the hypothesis of a converging evolution. Today there is not absolute confirmation of their evolutionary history in fact, as Karl Popper said “science never pursues the illusory aim of making its answers final, or even probable. Its advance is, rather, towards the infinite yet attainable aim of ever discovering new, deeper and more general problems, and of subjecting its ever tentative answers to ever renewed and ever more rigorous tests”. [8]

Although there are still no positive and definitive findings, it does not detract from the possibility of opening new horizons on human evolutionary history in the future. What we have discussed is, in fact, only a small part of the infinite case studies on which we could rely on the Neanderthal question, that is still unresolved today.

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SKELETAL ANALYSIS: PALEODEMOGRAPHICAL AND PALEOPATHOLOGICAL IDENTIFICATION AND STUDY TECHNIQUES

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Abstract: Anthropology is an area of biological sciences that studies a human from a naturalistic point of view, as part of a specific zoological group. The field of its research is oriented both to individuals and to the species as a whole. The person of the past and the person of the present are studied. Science tries to find an answer to the inevitable questions about the origin of human, his evolution and role in history.

Keywords: anthropology, skeletal analysis, paleodemographic studies, paleopathological studies, identification techniques, human species, skeletal remains, sex determination, age determination

Anthropology is the field of biological sciences that studies man from a naturalistic point of view, as belonging to a particular zoological

group. The field of this studies is vastly wide and focuses on both the individual and the whole species; the anthropologist's attention focuses both on the man of the past and the present, trying to answer the inevitable questions about his origins, his evolution and his role in history.

From the study of human skeletal remains, it is possible to reconstruct the biological profile, which contains a set of essential information useful for individual characterization. For this purpose it is necessary to estimate gender, age, stature, and any skeletal stresses that may be indicative for the analysis of the socio-cultural and work context of the individual.

Paleodemography is a science based on the analysis of skeletal material from archaeological excavations of prehistoric and historical age, and aims to evaluate the composition by sex and age of skeletal finds.

Paleopathology is another discipline that, like paleodemography, allows us to improve and enhance the anthropological study of human remains. It is based on the study of teeth and bones, in order to highlight the diseases from which man has been afflicted during his history. The skeleton is an outstanding archive that keeps the signs of the stress suffered in life.

Illnesses, food shortages, traumas, and in some cases the type of working activity, are recorded in the bone tissue and provide valuable information about a lifestyle of a person.

The study of this thesis was based on the skeletal analysis of some modern samples from the Palermo Rolls Cemetery and from an archaeological sample belonging to a mortuary complex located in Sicily, dating from the late antiquity .

Specifically, the context under consideration can archeologically arise in the V-VI sec. d.C. The hypogeum has twelve tombs made from rock.

After the extraction of the skeletal material, from a first analysis, it was clear that the remains were very fragmentary, and the nature of the soil did not allow the good preservation of the remains that, since exposed to the action of biostratinomic processes, went largely lost. It was therefore necessary, where possible, to reconstruct the long bones and parts of some anatomical districts.

Study Methods. The NMI calculates the minimum number of individuals present in an archaeological context by having only few fragments available.

For this estimation, at first, you have to group the bones by type and distinguish them by laterality, following a "maximum parsimony" criterion, in an attempt to avoid any double potential counting of the same individual. The elements that belong to the same district (eg. all femurs) are observed, with a focus on the ones that have the greater number of elements with the same laterality (eg. 4 femur right, instead of 2 femur left). Based on this information, you can then proceed to calculate the NMI.

For sex determination, simultaneously applying multiple methodologies can help to obtain a more reliable result and, if only partially, can obviate the subjective conditioning of the observer in processing the results.

Identification of sex. For sex identification, Bruzek focused on the simultaneous use of five traits of the pelvis, with which a correct diagnosis of sex can be obtained in 95% of cases.

Acsadi and Nemeskéri, instead, took into account 25 characters of the skull, pelvis, sacrum and femur that have been assigned a hierarchy of conventional values (pregnanza), according to the diagnostic power they have.

Another technique is DSP, it is based on the metric analysis of some elements of the pelvis that allows the sex of the subject to be determined with a probability calculation.

Calculation of biological age of death. Different methodologies were used to determine the biological age of death, depending on the development stages of the individual: fetal, perinatal, infantile, juvenile, adult.

The bones develop from separate ossification centers which, during their maturation, are welded together to reach the full form (for the attribution of the fetal and perinatal age). It is possible to consult the tables (Fazekas and Kósa, 1978) that correlate the appearance and degree of fusion of the ossification centers of the various skeletal districts at a particular moment of development, which is associated with a certain age.

Brotwell and Lovejoy dental wear analysis. Both methods attribute to the different degrees of dental wear and age class; Brothwell

takes only molar teeth into consideration, while Lovejoy examines the wear of the total teeth, independently evaluating those of the maxillary arch from those of the mandible arch.

Brooks and Suchey. In the young adult, the alveolar face looks very wrinkled, with obvious parallel grooves and crevices, and then becomes more and more lively with age. Each stage corresponds to an age range in which to place the skeletal element considered.

Skeletal material was distinguished on the basis of ethnicity and sex, thus providing specific and differentiated equations for each class of individuals, taking into account the interspecific differences between human populations and their sexualization.

The method involves the use of multiple regression equations and allows, based on empirical measurements of the bones of the limbs, to obtain an estimate of the height of the individual.

The remains of the analyzed individuals came in fragmentary form, so it was not possible to assure with certainty whether there were traces of illnesses (even serious) or not in the lost parts.

What can be affirmed is the presence of arthrosis, located in a phalanx and a metatarsal, and squatting facets in astragals associated with actions that weigh heavily on the lower limbs, such as long walks on rough paths, standing in the upright position or repeated shifts of weights.

Moreover, the analysis of the teeth found reveals poor oral hygiene of individuals, as evidenced by the presence of tartar.

With the study on modern samples, therefore, comparing the results obtained with those found in the anthropological charts of the individuals examined, it was possible to test the various useful methods for the reconstruction of the biological profile. Several techniques were used to determine sex, age and height, using the most suitable ones for the analysis of the sample in question.

This has allowed to acquire familiarity with the procedures necessary for the anthropological study of the skeletal remains of the Sicilian hypogeum tomb studied.

The calculation of the minimum number made it possible to state that at least five individuals were present inside the grave: one perinatal, two young people and two adults; it is therefore a multiple burial, widely used in late-ancient times.

Among the bones brought to light, only a fragment of pelvis allowed us to formulate hypotheses about the sex of one of the men, who was likely to be male.

In addition, the height of one of the two young people was calculated by measuring a complete tibia. On an average, it is 168, 54 cm (+/- 3.66) in the case of a female individual and 171.60 cm (+/- 3.37) in the case of a male one. In both cases, however, the height was higher than the average of the native population living in the late-ancient times, while it was similar to the other individuals within the same hypogeum, probably belonging to an allotment population.

Paleopathological analysis showed signs of arthrosis in some of the bones of the feet belonging to the young, squatting facets were found on the astragals, a symptom of repeated stresses on the lower limbs; on some teeth the presence of tartar was detected.

The data obtained from the analysis of the archaeological sample discussed in this thesis will be used for a larger scale study on the remains of the entire hypogeum.

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Cunzolo Valeria
**ANCIENT DNA: EXTRACTING AND SEQUENCING
TECHNIQUES**

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Abstract: This article reveals the topic of studying ancient DNA as an important topic from the point of view of scientific research in the field of paleoanthropology and genetics of the population.

Key words: ancient DNA, bacterial cloning, Homo neanderthalensis, archeological and paleontological information.

During the last twenty years the study of ancient DNA has become a crucial topic in terms of scientific research in the fields of paleoanthropology and genetic of population. The DNA is an organic polymer composed by a succession of nucleotides that follow one another according to predetermined rules of every living species. It is constantly repaired by a series of enzymes that allow it to work properly.

Savante Pääbo described for the first time the analysis of the DNA extracted from an ancient human remains, notably 23 Egyptian mummies. His research seemed to have brought important results back then. However, today those results are not reliable because the analyzed-remains were contaminated.

The main problem in the DNA extraction is its post-mortem degradation, because it increases with time and depends on its preservation.

One of the main problem in the study of the ancient DNA is contamination. It can occur during the phases of recovery or conservation.

Contamination is the simple contact between the analyzed DNA and fresh DNA coming from every kind of organism: bacterium, fungus, vegetable or animal. Fresh DNA is clearly more intact compared to the residual one and it tends to be preferentially amplified by the polymerase. One special case is human contamination of DNA samples coming from archeological hominidae or Homo sapiens.

In order to minimize this risk we need to follow some behavioral rules that are specific for every kind of recovered material. We need to have more information about the finding and its post-mortem history; the staff in charge of the recovery needs to be well equipped, notably masks, overalls and disposable gloves. Labs also need to be equipped and have separated zones for every phase of the study, so that the analyzed DNA doesn't make contact with the amplified or more recent one. Conservation also has a very important role because an erroneous conservation of the findings could lead to the proliferation of fungi or saprophyte organisms.

An article published on Science magazine in 2000 clarified a list of procedures to follow when studying ancient DNA in order to minimize the risk of contamination. The eight points of the list emphasize the fact that if during the study a high number of copies with very long fragments and a high number of amplified molecules are obtained, then in all probability the amplified DNA is not the one of an extinct hominide but the contaminant one, maybe your own. Another useful procedure is to type all the operators who have access to the sample, in fact it is preferable that these are few and always the same, so that having their DNA, during the studies, one can check if the sample was contaminated by them.

The small and few DNA fragments that are found in ancient remains need to be amplified prior to the study. Amplification means obtaining a high number of copies of the analyzed fragment. At first, the most common method was bacterial cloning, a technique that was soon considered unsatisfying and unreliable. The creation of the DNA polymerase chain reaction called PCR of Kary Mullis was a real turning point. The PCR turned out to be very useful because it helped to obtain several copies of a DNA fragment in a short period of time.

Eventually, many procedures on the basis of available resources have been identified and they evolved hand in hand with the modern tools of analysis.

Classic methodology is essentially composed of three phases: the first one is amplification by PCR of short overlapping target fragments, 60-200 pairs of basis-long in order to build bigger areas. The second one is the production and the sequencing of clones for every amplified fragments and the third one is the alignment and the comparison of sequences issued by clones and different overlapping fragments in

order to put back together the final consensus sequence of the entire area of interest. Today, thanks to the new technologies that allow a higher throughput of data, it is preferred to amplify the whole genome rather than an hypervariable region of the mitochondrion. In this way, the quality of the information issued by the study of ancient DNA increases considerably. These techniques are able to provide important information starting from little genetic material, allowing researchers to overcome the limits of classic methodology.

This has also brought progresses in terms of evolution of the species and other fields. Where theories and hypotheses were merely based on archeological and paleontological information, or on researchers' empirical deductions, today these can be accompanied and therefore proven (or not) by laboratory analysis. Today thanks to the study of ancient DNA, it is possible to investigate the Etruscan genome to see if it actually is similar to the Near East one. Thanks to this analysis it has been discovered that their origin is Italian, fact that has devastated the most reliable theory for centuries, the one that seemed to be supported by historical-anthropological evidence. That is the reason why a cooperation among the experts of various fields is necessary, so that they can reconstruct history in the most reliable way, using every tool available, not last the ancient DNA.

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**THE ISSUE OF TOXOCARIASIS DISTRIBUTION IN
URBANIZED ECOSYSTEMS**

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Abstract: This article is devoted to toxocariasis – a zoonotic disease to which humans and animals are susceptible. The article provides statistical data on the toxocariasis incidence in the population of the Russian Federation. In addition, the article focuses on the ecological and epidemic situation in the cities of Russia and provides recommendations for improving it.

Key words: Toxocariasis, zoonotic disease, *Toxocara canis*, the degree of epidemic danger, helminth.

The industrial growth, scientific and technological development as well as the increased number of cities and urban sprawl are steadily leading to improved living conditions and higher living standards of city dwellers. However, the downside of it is that cities are faced with a great number of parasites and stray animals. Synanthropic rodents, cockroaches and stray animals can be both sources and carriers of various diseases.

Yearly about 30,000 cases of geohelminthosis are recorded on the territory of our country (ascariasis, trichocephaliosis, toxocariasis, etc.). Toxocariasis plays an important epidemiological role in the geohelminthosis disease distribution in the Russian Federation. First of all, it is connected with some features of a helminth's life cycle and various ways of this parasite transmission. Cases of toxocariasis are

recorded in all climatic zones of the Russian Federation, (except the Far North) due to various factors that cause the prevalence of this disease. Fig. 1 illustrates the incidence rate of toxocariasis in Russia from 2000 to 2015. According to the data, there is a certain tendency towards an increased toxocariasis incidence on the territory of Russia. [1, 2, 3]

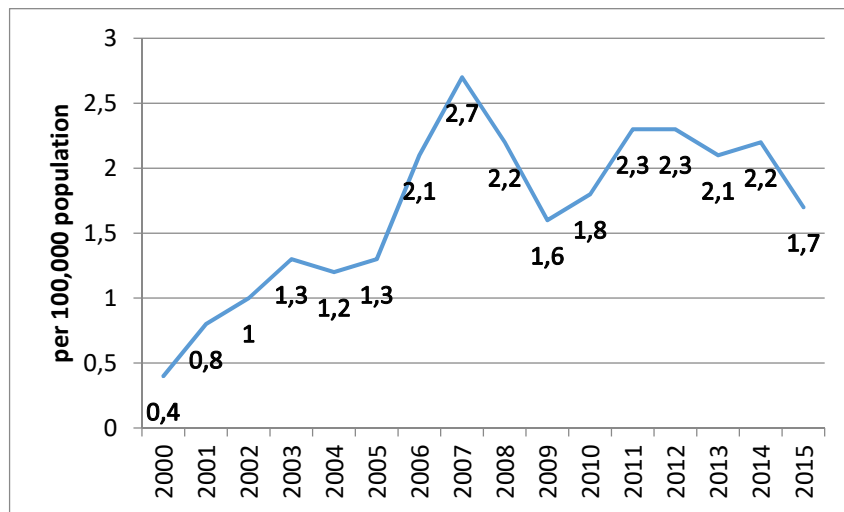


Figure 1 – The incidence of toxocariasis in Russia

Toxocariasis is a zoonotic disease caused by migratory larvae of *Toxocara* nematodes in organisms of animals and humans. This invasion is characterized by polymorphic clinical manifestations and prolonged recurrent attacks. Human is a biological dead end for this parasite. Alimentary transmission (eggs ingestion with contaminated food, water or from unwashed hands) is the main mode of getting infected. The epidemiological significance of toxocariasis is due to the fact that the source of invasion is an animal. Mainly, the final hosts are dogs and cats due to the prevalence of *Toxocara canis* and *Toxocara cati*, respectively. According to WHO, 60-90% of adult canines in the world are infected, and among immature animals - 100%. [4]

This disease is often ignored. Nowadays the problem of toxocariasis is getting increasingly urgent. There are several reasons for that:

- The population of carnivores is continuously growing in cities;
- Dogs and cats are close to people;

- It is difficult to diagnose the disease.

In most cities of Russia, walking grounds for dogs are not arranged. Thus, people walk the dogs in parks, garden squares and curtilage territories. Dogs contaminate the environment with excrements, which contain toxocara eggs. It leads to biocontamination of recreational areas, which poses a threat of infesting animals and humans in the future.

The research was carried out in 2016-2017 years. It was aimed at assessing the degree of epidemic danger of soils in the most important areas within the city, by the example of Krasnogorsk. This research was based on investigation of the soil of the most significant areas (high-risk zones) in Krasnogorsk for its contamination with invasive eggs of geohelminths (*Toxocara canis* eggs). [5]

The results of the study showed that the soil of curtilage territories was more polluted with *Toxocara canis* eggs (positive specimens: 10/50) than the soil of parks (positive specimens: 2/50) and children's playgrounds (positive specimens: 0/50). The soil of curtilage territories and parks in Krasnogorsk is rather polluted with toxocara eggs, while the soil of children's playgrounds is "clean". [5]

Based on the obtained results, recommendation for improving the sanitary and epidemiological situation in the city were made. First of all, they include the active outreach activities (educational activities) and arrangement of commonly available walking grounds for dogs.

Nowadays, toxocariasis is one of the urgent ecological problems of cities and megacities. The increase in the population of stray carnivores and parasites (cockroaches, rodents), which are paratenic hosts and contribute to the spread and survival of toxocara as a species, causes a high degree of soil pollution in cities and, accordingly, increases the risk of contracting this invasion.

Thus, there is a need to carry out activities for ecological and sanitary education of the population, to equip dog runs, to protect children's and recreational areas, to conduct regular dehelminthization of domestic dogs and cats, to comply with hygiene rules, etc.

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**MECHANISMS AND CHARACTERISTICS OF
TRANSFORMATION IN MYELOID AND LYMPHOID SPLEEN
TISSUES AND IDENTIFICATION OF NEW ADAPTATIONAL
CRITERIA FOR BLOOD AND IMMUNE SYSTEMS IN THE
POPULATIONS OF WOOD MOUSE EXPOSED TO
INDUSTRIAL HAZARDS**

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Abstract: Structural features of spleen in wood mice have been studied employing histological, morphometric and statistic methods. An experimental group included mature male and female animals from a buffer area of Orenburg gas plant. Splenic index and patterns of its variability were estimated. Reactive structural changes in

lymphoid and myeloid tissues have been shown. The rationale was given for using splenic index for biomonitoring of affected areas.

Keywords: wood mouse, spleen, relative mass, lymphoid tissue, myeloid tissue, hazards in gas industry.

Introduction. Spleen is an organ which function determines blood and immune parameters as well as immune response (Ag-dependent lymphocyte differentiation, antigen presentation, maintenance of plasma cells, macrophages, dendritic and interdigitating cells pools) and extramedullary hematopoiesis (including pathologic processes). Antigen exposure, blood conditions and aging always lead to reorganization of the splenic tissues, development of new tissue dynamics.

There is much debate in the literature on the increase in splenic index among small animals living in affected ecosystems with high levels of radiation and exposure to toxic environmental agents. Causes and mechanisms of this phenomenon are not established. The suitability of relative spleen mass for biomonitoring of affected areas is a relevant issue.

A classification of splenomegaly that takes into account its pathogenesis include more than 40 conditions with primary spleen disorders and secondary conditions.

In rodents, spleen is a vital organ, and splenectomy leads to their death. Moreover, hematopoiesis is a normal finding in their spleen and occurs across the lifespan.

Objective.

To define characteristics of lymphoid and myeloid spleen tissue transformation in wood mice from a buffer area of the gas processing plant.

To establish morphological criteria of splenic index as an indicator for biomonitoring.

Materials and methods. Fieldwork was conducted in a buffer zone of Orenburg Gas-processing plant (5 km). A control group was collected from healthy environment in Saraktash, Orenburg region. Wood mouse species (*Sylviaemus uralensis* Pallas, 1811) were captured in woodlands by line transect sampling from April until November. 50-100 mousetraps with baits were set in the nighttime, 2325 trap days were completed in the buffer area and 1073 trap days in the control

area. A representative sample included mature males and females (not pregnant, but sexually active). 219♂ and 182♀ spleens were taken in the buffer area, 144♂ and 110♀ in the control area.

Tissue processing was performed according to standard protocols. Histological sections were cut and stained with hematoxylin and eosin (H&E)

Results. Structural features of the spleens from the affected area proved high immunogenicity of environmental factors, and functional overload of blood system. In the control group, morphofunctional characteristics conformed to reactive processes; in the experimental group they resembled blood and immune pathology

In the control area spleen tissue dynamics had a normal spatial organization. Active granulo-, erythro- and thrombopoiesis occurred in cords of Billroth. A number of active lymphoid nodules in white pulp increased ($\sigma=50\%$). There was observed hyperplasia of T-dependent and B-dependent areas, but their volume ratio remained intact. In elementary populations of the control group spleen morphology belonged to this type. Parameters of morphological dynamics were homogenous.

3 types of spleen structural changes have been described in mice from the area of industrial pollution. The least number of species in the experimental group consisted of young animals, which showed no difference in the splenic processes in comparison to the control group. The amount of secondary lymphoid nodules increased twice as much.

A significant number of mice from the affected area showed decrease in the lymphoid tissue and emptiness of splenic cords (i.e. deficit in hemopoietic function). Lymphocytes were spread diffusely across the parenchyma.

The third group showed prominent proliferation and hyperplasia of lymphoid tissue. The main structural sign of it was aggregation and fusion of lymphoid nodules. White pulp lost its spatial organization.

Relative spleen mass in mice from the buffer area was reliably increased in comparison to the control group: $4,0\pm 0,2$ mg/kg and $3,1\pm 0,1$ mg/kg correspondingly ($t=4,10 > t_{0,001}=3,29$; $p\leq 0,001$). A slight tendency increase in the index is detected among females of the experimental group, comparing to the intact females: $3,4\pm 0,2$ mg/kg and $3,2\pm 0,1$ mg/kg ($t=1,2$; $p>0,05$).

Conclusion. The findings prove the role of gas industry for new conditions of functional activity in lymphoid and myeloid spleen tissues. Splenic index is a sensitive indicator of effects of the gas industry pollutants on blood and immune system.

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Kossinantao Hawa

**WORLDWIDE PETROCHEMICAL AND REFINERY
ACTIVITIES. ASSESSMENT OF THE IMPACT OF
INDUSTRIAL AIR EMISSIONS ON HUMAN HEALTH**

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Abstract In recent years, increasing attention has been focused on the health implications of large industrial establishments. Studying human health in areas with industrial contamination is complex. The framework is supported by examples related

to the adverse effects of petrochemical industries on environment and health. Risk assessment is a tool used in risk management. It is the process that scientists and government officials use to estimate the increased risk of health problems in people who are exposed to different amounts of toxic substances.

Key words: human health, industrial contamination, petrochemical industries, industrial activities, toxic substances.

Introduction. Sites highly contaminated by a variety of hazardous agents exist in many places. In many cases, contaminants are released by active industrial sources – routinely or accidentally – or are present in accumulated toxic waste from past industrial activities. Often, multiple agents exist simultaneously, posing a mix of certain or suspected risks. Despite the abundance of such contaminated sites and the considerable extent of their potential adverse effect on health, a methodology for studying their impacts, which quantifies (in real cases) the effects estimated, is still lacking. Also, the literature on the topic of contamination is somewhat sparse, and the policy implications of the available studies are not derived systematically.

Petrochemical production from crude oil includes olefins such as ethylene and propylene, aromatics such as benzene and toluene and many other derivatives. Also, benzene demand is forecast to grow at a rate of 41% a year between 2000 and 2020, resulting in total demand growth of 243 million tonnes [1]. Petroleum refining impacts are associated both with manufacturing operations and with the use of the finished products [2]. The major classes of processes typically carried out by refineries include:

- desalting
- atmospheric distillation
- reforming and extractions
- waste recovery and treatment.

The contamination process is related to:

- the unauthorized release of chemicals into surface water bodies, air, soil and (indirectly) the water-bearing stratum;
- the poor functioning of systems of control and abatement of emissions from industrial plants; and
- the production of toxic substances and/or waste disposal.

Contact with polluting substances can harm human organs – including respiratory, hematopoietic, hepatic and renal organs –

through a variety of acute and chronic mechanisms [3]. It is necessary to generate hypotheses about contaminants of concern that may be associated with a particular source and use, such as a manufacturing operation, laboratory, mode of transport, disposal area or waste site. Oil refining also produces large quantities of oil sludge that consists of hydrophobic substances and substances resistant to biodegradation. Due to incomplete data and information, chemicals with known adverse effects on health, such as dioxins, cadmium, mercury and pesticides, have not been included [4].

Characterizing industry-related exposure of residents in polluted areas requires detailed information on the spatial and temporal trends of the distribution of various chemicals; it also requires patterns of people's mobility, as well as the ability to predict exposure in unmonitored settings.

For large industrial facilities, such as petrochemical sites, it is probably correct to assume that no two sites produce the same complex mixture of contaminants in the environment [5].

The impact on human health of substances emitted to air by the industry is to be calculated with characterization factors (CFs) provided by the CML, Eco-indicator 99, EPS, EDIP and USEtox impact assessment methods. The impacts on human health obtained by simply dividing the emitted masses of substances by the respective minimal risk concentrations or minimal risk doses, are comparable to those calculated with the CFs of the model-based methods.

Conclusions.

Large industrial concentrations and petrochemical areas are spaces of intense capital accumulation where the preferred remediation measures are environmental clean-ups such as soil remediation, the installation of scrubbers on smokestacks, like catalytic converters in cars, rather than pre-emptive or proactive interventions. The main challenge is thus to develop a framework for bringing together a diversity of inputs to appraise the effects of industrial contamination on health. With regard to assessing and managing contaminated areas, a conceptual site model is needed.

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CHILDREN OF THE RISK GROUP IN THE MEGALOPOLIS: THE ECOLOGICAL ASPECT

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Abstract: Types of activities on the identification of children at risk by the social service of a multidisciplinary educational complex are analyzed. The ecology of the family, the criteria for family unhappiness, and the social microenvironment of Moscow as a metropolis are discussed. The necessity and effectiveness of

interdepartmental interaction for the prolonged impact on schoolchildren of this group is argued.

Key words: human ecology, children at risk; school social service; Moscow.

Introduction. The subject of this study are the school teachers activities and, in particular, the methods of educational work with children at risk and their families [2; 6]. In many respects, the family ecology and the reasons for children to enter such a group are connected with family unhappiness [4; 5; 8], the lack of participation of the father in the parenting [6]. The practical work of the social service of an educational institution is conducted within the framework of the Regulation [3] and includes interdepartmental interaction [1]. The study presents an analysis of the social service activities of a multidisciplinary educational complex during 2014-2017. The ways of identifying children at risk are described and facts of family problems are defined in order to rehabilitate such children and recover a favorable climate in the family.

Materials. The research was conducted during three scholar years by the social workers of a school complex, which was established in 2014 and unites five schools and seven pre-school institutions (13 buildings in the Eastern District of Moscow), with more than 2,000 schoolchildren and about a thousand pupils study. Muscovites, children from the Moscow region, children of migrants of different nationalities, children whose parents came from other cities of Russia are studying at this high school.

Methods: Social educators studied the world experience of research on the reasons for non-attendance of the school [10], ways of rehabilitation of such children [3; 9] and the restoration of a favorable climate in the family [7] and used their own personal experience. An impact analysis of development and implementation of joint actions with city departments on the family ecology was conducted, as well as observation, monitoring, classification of measures, the impact on children with different types of deviant behavior and on their families.

Results and discussion. The analysis of methods of influencing high-risk family ecology has revealed positive results of interaction with the commissions on the affairs of minors and protection of their rights, guardianship authorities, police departments, and Social Assistance Centers for families and children.

Initial stage. After the merger of schools in 2014, social educators conducted a survey and the results were as follows: 60 pupils were put on the school register of high-risk children; 18 persons have already been registered by the city commission on the affairs of minors and by the police before; two of them have already been prosecuted for various offenses; three did not attend school regularly; two were repeating a school year.

The situation of today. Only ten schoolchildren are registered as of high-risk in the school; two schoolchildren are surveyed by the commission on juvenile affairs. Those having been involved in criminal proceedings did not commit offenses for these three years. Schoolchildren repeating the year successfully passed the final certification. Former truants were not expelled, graduated from school with high school diploma.

The first step was to identify the situation of pedagogical failure in the schools merged to the “Vertical”. The analysis of the revealed reasons allowed us to set new goals for the social workers of the new school complex:

1. The function of the social teacher should be separated from the functions of subject teachers;
2. Individual work is to be implemented;
3. Interaction with high-risk families must be systemic;
4. Activities of form masters / mistresses (or tutors) need to be coordinated.

The second step was the development of the program of the social teachers’ activities for the early intervention and keeping minors from re-offending: the program was approved by the management of the high school.

The third step was educating the educators. A teachers’ meeting took place in 2014, fully devoted to the prevention program, in the form of a general discussion of 70 form masters / mistresses. Those of them, who had something to share in terms of concrete positive results, made reports. During these three years, meetings of Education and Methodics Association of the form masters / mistresses were held regularly.

The fourth step was to compile a detailed social profile (“social passport” in Russian) for children of risk groups. It was made jointly by social educators and form tutors. Knowing in depth the problems of the

pupil and his family's level of social well-being is half the way to help their condition to be positive.

The fifth step of the study was to conduct an analysis of the social profiles to establish the characteristics of the families in which the children of the risk group are growing.

The sixth step was the practical impact on children at risk and their families in close interaction with the bodies of the prevention system, with the police departments of the three Moscow districts served by the school. In 2014-2017 years social educators interacted with the police more than 40 times. The work is built informally. When the police go to a high-risk family, they are always accompanied by representatives of our social service. If the schoolchildren are detained by the police, representatives of the social service of the school often arrive to the police station earlier than the parents of the child. Conversely, policemen come to school to speak to children; representatives of the prosecutor's office take part in these conversations too. It definitely plays a positive role in the delinquency prevention.

Psychologists of the Center for Social Assistance to Family and Children of the Department of Social Protection of Population, in particular, have undertaken the task of educate antisocial parents (how to make sure that the child comes home in the evening, and does not spend time in the garages, or pipes).

Sometimes this interaction was very difficult. We worked on the principle of "carrot and stick": for example, together with the police and the center, we prepared materials concerning one of the students, who was refused to initiate criminal proceedings and at the same time did not attend the school systematically. These materials were examined in court, and the judge ordered to place the minor for 30 days in the center of temporary isolation. It is quite difficult to place a child in this center, but we succeeded. The young man spent in the center only two weeks and was released on the correction. The young man felt a desire to learn. This served as an example for his friends.

The center activists work with the parents, and also organize public information desks near school buildings when parents bring children to school or take them back home. The service is in demand: parents get expert advice.

Conclusions. The results of the analysis correspond to the world practice of improving the family ecology, preventing and combating backlog in education and the antisocial behavior of children and adolescents. At first, the point of view of the social teachers and guardianship agents did not always coincide, but during the joint consultations a strategy was worked out with each specific family. The described steps of the practical work of the social pedagogue are only a starting point for the painstaking and serious work of the whole pedagogical collective and the corresponding city departments.

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Kulikova O.I.¹, Orlova V.S.²
**ENVIRONMENTAL FACTORS AS MODULATORS OF
NEURODEGENERATIVE DISORDERS DEVELOPMENT**

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Abstract: Recently, the urgent task was to study the relationship between environmental pollution and human health. Neurodegenerative diseases are among the most common disorders that caused by environmental toxins. The mechanisms of neurotoxins action and ways to prevent their harmful effects are important to study.

Key words: neurodegeneration, neurotoxins, antioxidants.

Exposure of environmental neurotoxins such as heavy metals, pesticides and other chemical agents is increasingly recognized as a key risk factor in the development and pathogenesis of chronic neurodegenerative disorders. Examples of such disorders are Parkinson's disease (PD), Alzheimer's disease (AD), Huntington's disease (HD), amyotrophic lateral sclerosis (ALS). The development of all these diseases is associated with the neuronal lesion in different regions of central nervous system (CNS).

Neurotoxins is readily available in the environment in many forms from multiple sources and enter into the human body and particular in the CNS in various ways: through polluted water, air, soil, food. Interest in potential environmental causes of neurodegenerative disorders was stimulated by the identification of specific toxins. Thus, contact with pesticides rotenone and paraquat may be a risk factor for earlier onset of the PD in persons living in rural areas [1]. Case-control studies indicate that living near to water-bodies with cyanobacterial blooms, that produce cyanobacteria-derived neurotoxin β -N-methylamino-L-alanine, increases the risk of developing ALS [2]. Epidemiological studies indicate an association of neurodegenerative diseases with polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and dioxins which are common by-products of industrial processing and combustion of any carbon source [3].

Thereby, an important achievement is the use of neurotoxins to model various diseases. This allows finding substances that can protect the cells and organism from toxic effects and prevent the development of the disease, and possibly cure it. Entering the toxin in neuronal cell leads increased production of reactive oxygen species and when the antioxidant system is depleted, oxidative stress occurs [4]. Oxidative stress and apoptosis have been actively investigated as neurotoxic mechanisms of neuronal lesion.

In these conditions, it becomes relevant to use substances that can deactivate reactive forms of oxygen – antioxidants. We was demonstrated that antioxidants such as natural dipeptide carnosine possess a capability to enhance the resistance of cultured neuronal cells in conditions of heavy metal toxicity (lead, cadmium, cobalt and molybdenum), increased cell viability and decrease quantity of dead cells [5]. In experiments on animals we indicate a significant decrease in the activity of endogenous antioxidant defense system and the development of oxidation processes in tissues of rats during the systemic administration of cadmium. Simultaneous administration of carnosine with cadmium inhibits lipid peroxidation and prevents the depletion of endogenous antioxidant defense of the nervous tissue in this conditions [6].

The current research proves that diverse forms of pollutants have been widely implicated in inflammation and oxidative stress in humans. An urgent task of further researches is the detection of environmental pollutants responsible for the development of severe neurodegenerative disorders and search substances that can withstand their development.

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THE EFFECT OF ENERGY DRINKS ON THE HEALTH OF THE HUMAN BODY

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Abstract: Over the past dozen years the pace and rhythm of modern mega-cities have so far increased, that people have ceased to recover, they have become more irritable, tired, and are increasingly resorting to artificial force and energy stimulants. In the laboratories producers of energy drinks are developing increasingly new and more "explosive" energy, which can restore power and life tone as quickly as possible according to their promotion slogans.

Key words: dangers of energy drinks, effects of energy drinks on the body, energy drinks and health, energy drinks side effects, long term side effects of energy drinks, short term effects of energy drinks, symptoms of too many energy drinks.

Introduction. The issue of the harm of such energy drinks has been constantly discussed recently, different scholars have expressed divergent views for and against. They are conducting various scientific experiments and studying the harm and benefits of the various components of energy drinks. In January 2015, preliminary results of

the "Research on caffeine security" amounting to 95 pages published by the European Food Safety Office (EFSA). It was prepared by EFSA Scientific department Scientific on diet Food, nutrition, and allergies in Parma, Italy, where the safe optimum dose of caffeine for humans has been identified. [3]

In addition, scientists study the interaction of energy drinks and other stimulants, e.g. alcohol, with drugs. In September 2015 a recent study, which compared intoxication after drinking alcohol with intoxication after drinking alcohol and energy drink, were carried out under the supervision of Amelia Marscunski, A.P. of the psychology from North Kentucky University. The research compared post-alcohol and post- energy drink intoxication. According to the results of the study, the combination of alcohol and energy drinks is more dangerous for humans than pure alcohol.[1]

Research objective : - to prove that the use of energy drinks is not an effective means of raising the standard of life; - to prove that energy drinks have a negative impact on the physiological processes of the human body showcasing people with an active lifestyle.

Methodology:

1. Theoretical study and analysis of scientific literature;
2. The sociological survey and analysis of its results: To identify the level of knowledge about the impact of power engineers on the human body, we conducted a survey of clients fitness clubs in Moscow.
3. Experiment:

We conducted experimental studies of fitness club clients of different age groups (from 15 to 50 years). Before the beginning of the experiment, we measured the Ruffie-Dixon index for all participants in the experiment using a fitness test to determine the health of the organism.

4. Synthesis and systematization of the received information.

Subject: Energy drinks

Results of Calculations

In the course of our work we have conducted experimental studies of the fitness club customers from different age groups (15-50 years). Before starting the experiment we have measured Ruffier - Dickson index among all the testees to determine the health of the organism with the help of the fitness test. [2]

To determine the Ruffier - Dickson index we used stopwatch

and heart-rate monitor by explorer GLX.

After the primary use of the energy beverage the testees noted the following psychophysiological sensations: drowsiness, muscle weakness, dizziness, headache symptoms, reduced efficiency, general malaise. Indeed according to scientific sources, the reception of a large amount of caffeine can not only stimulate work efficiency, but also can generate a paradoxical decline of efficiency up to oppression.

Results

In the course of the experiment we have recorded the following indicators: arterial pressure and pulses before and after the energy drink.

Table 1 - Energy drinks impact on blood pressure indicators

Age	Pressure (mm Hg) before	Pressure (mm Hg) after
15	98/71	119/79
16	103/75	121/81
17	115/71	128/79
21	100/79	120/83
22	110/72	119/78
22	105/69	124/74
23	103/77	129/88
24	111/82	130/87
24	114/82	129/79
25	114/73	131/89
27	100/68	128/79
28	101/67	120/83
29	110/88	119/78
30	114/82	131/88
34	110/73	118/75
39	100/68	110/71
40	120/83	139/90
46	119/76	103/71
50	106/71	130/83

Table 2 - Energy drinks impact on pulse rate

Age	Pulse rate before	Pulse rate after
15	60	73
16	63	78
17	69	95
21	56	77
22	70	87
22	77	93
23	76	98
24	80	100
24	82	104
25	88	108
27	71	106
28	83	96
29	91	111
30	87	98
34	100	115
39	101	115
40	107	119
46	90	81
50	105	117

It can be concluded from the obtained results (Table 1 and Table 2) that the intake of energy drinks significantly change the rate of blood pressure in different directions. Teenagers 15-18 years after the intake of energy drinks had the blood pressure increased, vice versa an adult 46 years had his blood pressure decreased.

These changes can be explained by the fact that energy drinks contain high levels of caffeine and taurine, which are neurostimulator activating sympathetic nervous system. The result of this process may be the narrowing of the blood vessels and, as a consequence, increase of the blood arterial pressure. Lowering of the blood pressure of the testee at the age of 46 can be explained by the fact that occasionally energy drinks can have a negative effect expressed in sleepiness, weakness and apathy. But this effect depends on individual

characteristics and health conditions of the human.

In the course of further research, we had to determine the time for the restoration of the indicators of blood pressure and pulse of the human body after the acceptance of the energy drink. Using the above techniques, we have measured the same indicators before and after the use of the energy drinks (according to scientific sources, the effect is already noticeable in 30 to 60 minutes) and then repeated the measurements every 30 minutes, waiting for the compliance of the indicators to their original value before the drink.

The results are clearly represented in the Table 3 and Table 4.

Table 3 - Health indicators recovery time (in minutes)

Age	Pressure (mm Hg) before	Pressure (mm Hg) after	Blood pressure in 30 min.	Blood pressure in 60 min.	Blood pressure in 90 min.	Blood pressure in 120 min.	Recovery time
15	98/71	119/79	118/75	110/75	90/71	92/69	1h 30min
16	103/75	121/81	122/85	117/77	103/71	101/73	1h 30min
17	115/71	128/79	126/75	123/72	120/69	116/76	1h 30min
21	100/79	120/83	121/83	117/80	101/67	104/80	1h 30min
22	110/72	119/78	117/76	112/70	110/88	110/72	1h 30min
22	105/69	124/74	120/75	109/68	104/82	105/69	1h 30min
23	103/77	129/88	125/84	111/81	102/73	103/77	1h 30min
24	111/82	130/87	131/86	118/75	100/68	111/82	1h 30min
24	114/82	129/79	126/80	122/85	122/85	115/83	2h
25	114/73	131/89	134/88	126/75	122/73	114/73	2h
27	100/68	128/79	128/79	121/83	118/88	109/78	2h
28	101/67	120/83	120/83	117/79	118/74	101/67	2h
29	110/88	119/78	119/78	112/75	116/83	110/86	2h
30	114/82	131/88	129/79	125/84	119/78	112/82	2h
34	110/73	118/75	131/89	124/79	129/79	111/76	2h
39	100/68	110/71	111/79	101/69	131/89	103/68	2h
40	120/83	139/90	129/83	118/79	111/79	118/83	2h
46	119/76	138/94	140/96	131/91	121/85	117/76	2h
50	106/71	130/83	127/86	121/82	111/82	103/71	2h

In conclusion. On the basis of the obtained results it can be deduced that the bulk of the energy drinks make it possible to feel the maximum effect after 60 min, and this effect lasts mainly for the hour or half an hour, and then the slowly declines.

The duration of the energy drinks effect depends on the amount of drink, but as well on the age of testee, individual characteristics of the morphology and physiology, and on the speed and intensity of the exchange processes on the organism.

Thus, we have gained the results that have confirmed and supplemented already known knowledge on the impact of energy drinks on the human body. This have led to the conclusion that the excessive use of the energy drinks can make a negative impact.

Based on the above-mentioned results the following conclusions can be drawn:

The observation identified the reverse effects of the energy drinks - general malaise and apathy, reduced efficiency, sluggishness. Energy drinks intake influences the state of the cardio-vascular system. If these drinks are used excessively they can cause hypertensive crisis, tachycardia and heart arrhythmia.

The duration of the energy drinks effect depends on the individual morphology of the testee and is approximately 1-2.5 hours.

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Leonenko Svetlana
**S.N.EVALUATION OF SUFFICIENCY OF
VITAMINS B1, B2 AND B6 BY NONINVASIVE METHODS FOR
CHILDREN ATTENDING PRE-SCHOOL IN
YEKATERINBURG**

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Abstract: Vitamins are especially important in childhood, insufficient sufficiency of vitamins adversely affects the formation and development of children. Vitamins play an important role in the metabolic processes of the body. Vitamins improve the body's resistance to adverse environmental conditions.

Key words: vitamins, preschool children, deficit, insufficiency, non-invasive methods, vitamin - mineral complex, urinary vitamin excretion.

Introduction. Nutrition plays a major role in human life. Food is a source of nutrients. Vitamins playing an important role for organism are required in very small quantities and belong to micronutrients.

Vitamins are involved in all metabolic processes, increasing the organism's resistance to adverse environmental factors, microorganisms, viruses. Sufficient intake of vitamins is necessary for the normal functioning of the organism, for growth, physical and mental development of children.

The objective was to evaluate with the use of non-invasive methods (urinary excretion of vitamins) the sufficiency of preschool children with B-group vitamins.

Material and methods. A survey of children in the winter period in 2016 was carried out after signing the informed consent of their parents on the basis of the kindergarten №339 "Nadezhda" in Ekaterinburg. The study protocol was approved by the ethics committee of Federal Research Centre of Nutrition and Biotechnology.

51 children (26 boys and 25 girls) between the ages of 2 to 7 years (mean age 4.7 ± 1.1 years) have been observed. Physical development of the majority of children was in line with age regulations.

Sufficiency with vitamins was estimated by excretion of vitamins or their metabolites with the morning portion of urine collected during 40 - 150 min. on an empty stomach [1, p. 119]. Thiamine (vitamin B1)

was determined by fluorescence thiochrome method [2, p. 19]; Riboflavin (vitamin B2) – by spectrofluorimetric titration with riboflavin-binding apoprotein [2, p. 24;]; 4-pyridoxic acid (vitamin B6) – by fluorescence method [2, p. 31]. Valid values obtained in previous studies were used as criteria for vitamin status assessment [3, p. 41]. Children with indicators below the lower limit of norm were considered to have inadequate supply with vitamins.

Significance of fraction differences was assessed by Fisher test.

Results and discussion. The main food was given to children in children's preschool educational institution in accordance with the approved diet and a specially designed menu. On weekdays in the evening, children additionally received separate food or ready meals at home, on weekends children ate at home.

At the time of the survey, only 12 children (23.5%) received vitamins, among them 7 children (13.7%) vitamin-mineral complexes, 2 children (3.9%) – vitamin C, 2 child (3.9%) – vitamin D and 1 children (1.9%) – complex, containing PUFA with vitamins A, E, D.

The assessment of vitamin status showed that reduced vitamin B2 urinary excretion was detected in 31.4% of the examined children. Insufficiency with vitamins B1 and B6 was revealed more frequently (68.6-76.5%). Sufficiently supplied with vitamin B6 were only 11.8% of children, and 11.8% of them had urinary excretion corresponding to the marginal sufficiency.

In children receiving more than 3 servings of dairy products at home daily, the median of riboflavin excretion was 1.7 fold higher than that in children who consumed less of these foods, which reflected their better sufficiency with vitamin B2. Children who consumed meat and cereal products more often were better supplied with vitamin B1 and B6, as evidenced by a higher (by 1.2-1.4 fold) median of urinary excretion of thiamine and 4-pyridoxic acid.

Only 21.6% of children were sufficiently supplied with all studied vitamins, combined deficit of 3 vitamins was detected in 27.5% of children.

Comparison of the results with previously obtained data in the survey of preschool children of the Moscow Region shows that their vitamin status is almost the same [4, p. 54]. The obtained data indicate the need to correct vitamin suppling of children.

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**DYNAMICS OF THE PSYCHO-FUNCTIONAL STATE AND
THE ADAPTATION LEVEL OF THE STUDENTS OF RUDN
UNIVERSITY ECOLOGICAL FACULTY AT THE INITIAL
STAGE OF LEARNING**

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Abstract: In this thesis, a comparison of the psycho-functional state of the students in 2009 and 2015 is presented. Various approaches to the environment and the psycho-functional state of students are described in the study.

Keywords: psycho-functional state, adaptation level, respiratory system, cardiovascular system.

Introduction. In modern conditions of life, a person is exposed to anthropogenic environmental factors which have a significant effect on the health of an individual. According to the literature, over the last 15-20 years the incidence rate among the youth has increased by 8-10% [1, p. 395]. While at school 40-50% of senior pupils suffer from chronic diseases, by the graduation time students with chronic diseases make up 85-90% [2, p. 78]. Currently, it is relevant to identify risk factors and establish health-saving programs.

The objective of the study is evaluation of the psycho-functional state and the adaptation level of the students of the ecological faculty at the initial stage of learning [3, p. 565].

The tasks of the study are as follows:

To study the impact of environmental factors on the psycho-emotional and psychophysiological state of students.

To determine the impact of environmental factors on the dynamics of the psycho-functional state and the level of adaptation.

To develop recommendations for improving students' adaptation.

The research was conducted in three stages:

At the first stage, research data on the second year students of the Ecological Faculty for 2009 was taken at the Department of Human Ecology.

At the second stage, in 2015, a study was conducted for the 2nd year students of the ecological faculty. (In 2009 and 2015, 40 people, 20 young men and 20 young women, at the age of 18-20 were selected for the study).

The third stage was to analyze the results obtained.

The study used the anthropometric, physiological, and psychophysiological methods. For example, using physiological methods, we measured blood pressure, heart rate, and respiratory rate.

We conducted a survey and identified the environmental factors that have a significant impact on the psycho-functional state and the adaptation level of the students, and then grouped the factors into the following types: pedagogical, social-psychological, individual [4, p. 367]. To assess the psychophysiological state of the students we studied the indicators of the respiratory, cardiovascular and nervous systems, the most relevant and informative of them will be presented further:

- The complex index of Skibinskiy, which assesses the functional reserves of respiratory and cardiovascular systems. Analyzing the

diagrams, you can see that in 2015 the number of students with a high (favorable) index of Skibinsky decreased by more than 15%.

- The physical condition level as well as a complex indicator which helps to assess physical health, and physical performance. It can be noted that in 2015 the number of students with a high physical condition level decreased by 20%.

- The arterial systolic pressure. The percentage of students with elevated systolic pressure has increased over the years. The diastolic blood pressure, the opposite situation is observed. By 2015, the number of students with low diastolic pressure had increased by 15%.

- The body mass index, it is a complex indicator (Growth-to-weight ratio). Comparing the diagrams for 2009 and 2015, it should be noted that the number of students who have a lack of weight increased (by over 10%).

- Chronic fatigue. The 2009 results seem very optimistic unlike those of 2015. In 2015, more than half of the students experienced an initial and severe stage of chronic fatigue, and 5% had a pathological chronic fatigue.

According to the results obtained we can draw the following conclusions: the majority of students (67%) face problems of adaptation in their student life, caused by a new educational system, overloaded with learning, inability to organize themselves, and low motivation.

Conclusion. Comparative analysis of environmental factor impact on the dynamics of the adaptation processes in the students of the ecological faculty for a 6-year period (from 2009 to 2015) showed a tendency to deterioration of the psycho-functional state:

- According to the indicator of the Index of Skibinskiy, the decrease was 15%, and the physical condition level was 20%;

- For the chronic fatigue, the decrease was 60%;

- As to the indicators of the vital lung capacity, the decrease was 10-15%, and the arterial pressure showed an increase of 10%.

Some measures have been developed to improve students' adaptation. They depend on the most important factors of social environment. These measures are, for example:

- To reduce the impact of individual and personal factors it is necessary to develop a cycle of practical exercises on the ability of psycho-emotional self-regulation of students;

- To reduce the impact of pedagogical factors, it is necessary to give students an adequate understanding of the chosen profession [4], awareness of the public importance of this profession, and a positive attitude towards it.

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Paukova A.A.

**ASSESSMENT OF HARMFUL AND (OR) HAZARDOUS
PRODUCTION FACTORS OF “TDW EURASIA”’S
WORKPLACES**

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Abstract: People spend the biggest part of their lives at their workplaces. Every working environment has its production factors. These factors affect human health greatly.

Key words: production factors, measurements, noise, local vibration.

Mechanized devices, lifting devices and vehicles, parts of instruments and equipment refer to hazardous physical production factors. Noise and local vibration, that come from the equipment, refer to hazardous physical factors as well [1].

Special assessment of labor conditions was carried out at the enterprise “TDW Eurasia” by the company “VHF “ALEXANDER” in 2016. According to the results of measurements, there are such hazardous production factors as Noise and Local vibration. These factors influence 15 workers at this enterprise.

Indexes of both production factors don't exceed normative values. Though these indexes are at the border of normative and actual indicators (fig. 1, fig. 2).

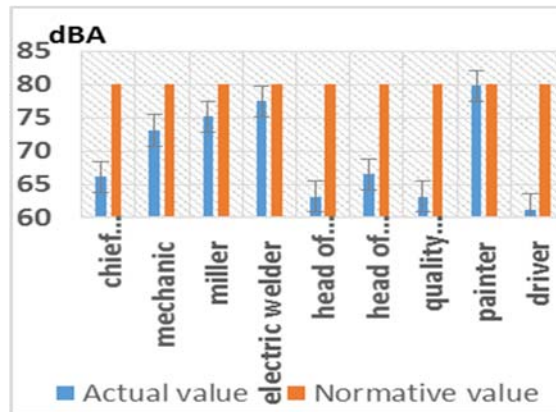


Fig.1. Comparison of Noise factor indexes at workplaces

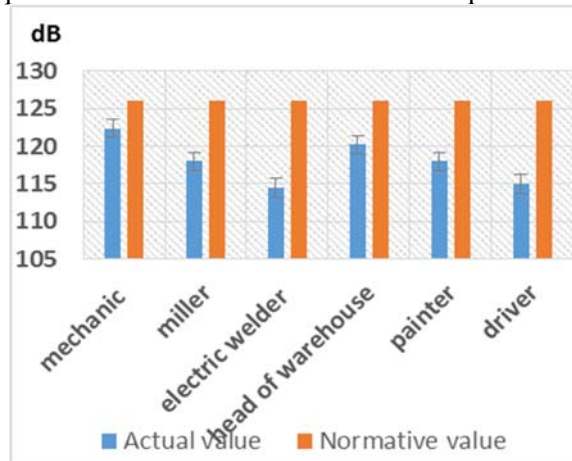


Fig.2. Comparison of Local vibration factor indexes at workplaces

Noise factor sources at the enterprise are:

- drill Makita,
- sander Makita,
- specialized milling machine Innovic Technolog,
- welding machine Lincoln Electric Power Wave S500,
- gas cutter P1,
- loader HELI CPCD50,
- sandblasting machine,
- pulverizer,
- freight car KAMAZ.

Local vibration factor sources at the enterprise are:

- drill Makita,
- sander Makita,
- specialized milling machine Innovic Technolog,
- loader HELI CPCD50,
- sandblasting machine, freight car KAMAZ.

Taking into account the presence of Noise and Local vibration harmful and hazardous factors at workplaces at the enterprise, the employer must carry out a technical inspection of the equipment. In case of equipment failure, the employer must repair or change it. Finally, according to the Labor Code of the Russian Federation all workers should have personal protective equipment [2].

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Pichugina E.K.
**EVALUATION OF THE PSYCHO-EMOTIONAL STATE (CNS)
OF STUDENTS DEPENDING ON THE LEVEL OF THEIR
PHYSICAL ACTIVITY**

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Abstract: Hypodynamia is an actual problem of student youth. Reduced motor activity leads to a deterioration in the health of students and a decrease in the quality of their education.

Key words: hypodynamia, motor activity, CNS, students.

One of the actual problems of modern students is the problem of the low level of adaptation of students to study work, which undermines the quality of their education (Meerson, FZ, 1973). This problem is associated with a significant deterioration in student health (Lopez, A.D., Mathers, C.D., Ezzati, M., 2006). One of the main causes of the emergence of pathological conditions is a progressive deficit of physical activity (hypodynamia). Often it is due to the specificity of the motor regimes throughout the entire period of study at universities. The lack of youth physical activity of Russia is 60-75% of the normal level necessary to maintain a normal level of health and physical state (Gostev RG, 2004).

In connection with the importance of the problem of hypodynamia, we conducted our own study of the psychophysiological state of a group of students, specifically, the level of their activation of the central nervous system, depending on the level of their physical activity. The experimental group consisted of 73 PFUR students of both sexes (35 boys and 38 girls) in the age group from 17 to 21 years who do not engage in sports professionally and have different levels of physical activity - from low to high. All the students of this group were students of different courses of the ecological faculty of the PFUR. The study was conducted using a questionnaire and a special device called "Psychophysiologicalist".

According to the results of the questionnaire, it became clear that 46% of young men have a high level of physical activity, 54% -

medium and low; Girls with high level of physical activity - 40%, the remaining 60% - with a medium and low level.

Based on the results of testing a group of students at the Psychophysicologist, it became clear that 62.5% of male students with a high level of physical activity had a positive psycho-emotional state, a negative psycho-emotional state - 37.5%; Among young men with medium and low levels of activity, a positive psychoemotional state is observed in 55% of students, and a negative psychoemotional state in 45%. Summing up, it can be said that the students-boys can trace the probable relationship between the psychoemotional state and the level of physical activity, since in the majority of students with a high level of motor activity it is stable in the conduct of active lifestyles. However, the same conclusion cannot be made when assessing the relationship between the psychoemotional state and the level of physical activity of girls, since testing showed that 53% of female students with a high level of activity have a positive psychoemotional state, 47% of girls have a negative psychoemotional condition. In female students with moderate and low levels of activity, 83% of girls have a stable psycho-emotional state, and unfavorable - 17% of girls. Therefore, it is impossible to conduct a direct relationship between the psychoemotional state of girls and their level of physical activity.

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ECOLOGY AND BIOSYSTEMS

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FEATURES OF THE ECOLOGY OF THE EUROPEAN BEAVER (CASTOR FIBER) IN URBANIZED ENVIRONMENT

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Abstract: the study is devoted to monitoring the vital functions of the European beaver in metropolis conditions, in order to assess the anthropogenic pressure, it is exposed to in a metropolis.

Key words: monitoring, European beaver, settlement, metropolis, anthropogenic pressure, semi-aquatic, edificatory.

The study is an ongoing monitoring of a beaver settlement (about 2 years) for relationship between beavers and other inhabitants of the river, as well as anthropogenic factors. Thus, the purpose of this work is to study a settlement of the European beaver located in Moscow and assess the anthropogenic pressure it is exposed to in the metropolis.

The study has been carried out on the territory of the monument of nature "The Valley of the River Khimki". The length of the river is about 18 km below the dam of the Khimki reservoir, the river is fed by the springs of Pokrovskoe-Streshnevo Park. The nature monument was established in 1991, its area is 15.2 acres. There are alder forests as well as fragments of meadows and lowland swamps in the floodplain of the river Khimki. A beaver dam with a length of about 7 meters is located downstream. There grow such plants from the Red book of Moscow as ostrich fern, May lily, yellow anemone, corydalis, water forget-me-not, great bellflower and nettle-leaved bellflower. It is also a habitat for some bird species that are rare in Moscow: red-headed and tufted duck, hobby, moorhen, crow, long-tailed tit [1].

The object of the study. European beaver (*Castor fiber* L.) belongs to the order of rodents. [3] It is a semi-aquatic, exclusively herbivorous animal that rarely moves farther than 100 m away from the

pond. The length of the body is 75-120 cm; the weight is 20-30 kg. [4] Beavers are common in the boreal part of Eurasia from the Atlantic coast to the Baikal region and Mongolia (acclimatized in Primorye and Kamchatka). It inhabits shores of small ponds, slowly flowing rivers, lakes, ponds, reservoirs, irrigation canals and quarries. [3] It lives mostly in families. A full family consists of a couple of adults and some youngsters born in the past and current years. Beavers build lodges on low swampy shores and shallows, they are cone-shaped piles of twigs, sealed with mud, their height is 1-3 m and diameter is 10 m [5].

Families of beavers build dams below the settlements in order to maintain the water level in the reservoir. A dam consists of pieces of cut tree trunks, branches, twigs, held together by clay, silt [4]. Beavers are guided by the sense of smell and mark their territory by the secret of musk glands called castoreum [6].

Beavers eat bark, thin branches of trees, leaves, preferring aspen, willow, birch, water, and riparian herbaceous plants [3,4]. Beavers are active at night and at dusk in summer, in winter their activity decreases and shifts to the daytime [3].

Their breeding season lasts from the mid-January until the end of February. Cubs are born in April – May. Sexual maturity is reached in the second or third year of life [5].

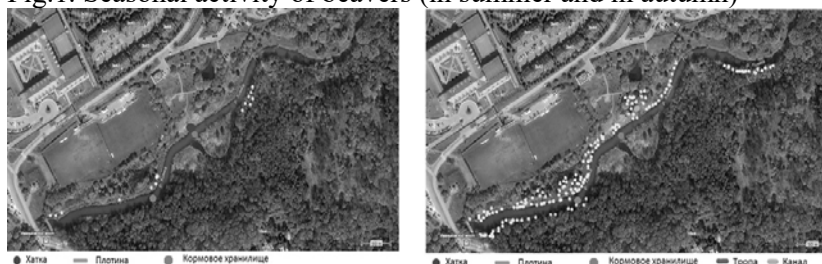
Beaver provides valuable fur and beaver stream used in perfumery and medicine. Its meat is used for food. Because of intensive hunting it was on the brink of extinction. European beaver is saved in national parks, from which it is artificially resettled to the places of their former habitation [3].

Methods of research. Monitoring is conducted once a week for 2-4 hours in the evening, time is determined by beaver's daily activity [2]. Thus, the method involves observation and analysis of the results obtained. All their activities, periods of activity, quantity of eaten or stored food, their habits, the relationship between themselves and other inhabitants of the river such as ducks, muskrats, water voles, rats, as well as the effect of anthropogenic factors are recorded.

During the monitoring period we have mapped the territory of the river, determined the species composition of plants – raspberries (*Rúbus idáeus*), black alder (*Álnus glutinósa*), Siberian larch (*Lárix sibíríca*), birch (*Bétula péndula*), white willow (*Sálix álba*), crack willow (*Sálix*

fragilis), etc. We have also revealed what plant food beavers prefer: aspen, willow, raspberry, sedge, wormwood.

Fig.1. Seasonal activity of beavers (in summer and in autumn)



Beavers live in Moscow on the outskirts of the Park in a few meters from the road and brick buildings. Beavers are edificators, so in the middle of the river, where most of their activities take place, there are a lot of moves and dams. 2-3 individuals from the whole family are not afraid to get closer to people. Beavers carry into their huts larger parts of the apples and other fruit and vegetables that people throw into the water. Smaller parts are eaten by them on the spot, while swimming in shallow waters. They often mark their territory with odorous beaver stream, alerting other animals of the Park.

Conclusions

- At least seven individuals of European beaver live in the park Pokrovskoe-Streshnevo in Moscow.
- Beavers' spatial activity are mainly concentrated in a radius of 20 m from the hut, but during their feed of banks they are moving away from the water's edge up to 40 meters from the hut and in the water up to 300 meters.
- The biogeocenotic role of the beaver as an edificator of the Himka river is enormous. With increase in the area of the water surface of the river, the relative number of types of the living organisms sharing one ecosystem with beavers has increased.
- The manifestation of human impact on the park is very big, but no negative effect of human activities on the beavers has been revealed.

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**TWO COMPARISON AREAS: NEBRODI REGIONAL PARK
AND VALDAYSKIY NATSIONAL PARK**

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Abstract: The article deals with the comparison between the Nebrodi Regional Park and Valdayskiy Natsional Park from the climatic and geomorphological point of view and the comparison between the animal and plant species present in the two parks.

Keywords: Nature, park, species, climate, ecology, national park, Palermo, Russia, flora, fauna.

This work has been developed as a result of the experience pursued at the Lomonosov State University of Moscow, in collaboration with the University of Palermo (UNIPA) thanks to the Italian-Russian Institute of Ecological Education and Research and its President, Coordinator, and Secretary (Prof. Valerio Agnesi, Matteo Cammarata, Leonardo Gatto).

The project is based on the comparison between two different areas: the Nebrodi Regional Park in Italy (Sicily) and the Valdayskiy Natsional Park, in Russia.

The Nebrodi Park is the largest natural conservation area in Sicily. [7]

Nebrodi Mountains, together with Madonie in the west and Peloritani in the east, form *Appennino siculo*. The forests notably affect the climate of the territory that is characterised by its long and rigid winters, and hot summers. The temperature normally stays at around 10-12 °C whilst the rain, the snow and fog are frequent, and their influence is fundamental, as it creates the necessary humidity for the existence of certain types of forests. The geomorphological origin of the territory ranges from the Paleozoic to the Pleistocene. The essential peculiarity of the orographic situation is the gentleness of the reliefs deriving from the presence of wide banks of clayey-arenaceous rocks. Where the limestone prevails, the landscape shows dolomitic aspects, with irregular profiles and harsh shapes with many fissures. [3].

Leaving the coast and climbing the mountains, it is possible to immediately recognize specific vegetational levels depending not only

on the altitude distribution, but also on the singular physical factors that, together with temperature and abundant rain and snow, defines favorable ecological conditions. [4]

From the sea-level up to 600-800 meters, is characterized by the typical evergreen Mediterranean maquis:

- <i>Erica arborea</i>	- <i>Arbutus unedo</i>	- <i>Quercus pubescens</i>
- <i>Mirtus</i>	- <i>Quercus suber</i>	

Above the 800 meters of height and up to the 1200-1400 meters a.s.l., there is the supramediterranean level:

- <i>Euphorbia dendroides</i>	- <i>Quercus petraea</i>	- <i>Genista aristata</i> (a sicilian endemit)
- <i>Pistacia lentiscus</i>	- <i>Quercus cerri</i>	- <i>Quercus gussonei</i>
- <i>Quercus ilex</i>		(a sicilian endemit)

Above 1,200-1,400 meters of height, mountain-Mediterranean level presents, beech woods (boschi di faggio), marvellous wood formations covering the whole ridge of Nebrodi for more than 10,000 hectares and characterizing environments of great value for their naturalistic aspects and their landscape: [4]

- <i>Quercus congesta</i>	- <i>Fraxinus ornus</i>	- <i>Fagus sylvatica</i>
- <i>Acer pseudoplatanus</i>	- <i>Petagnea gussonei</i>	- <i>Ilex aquifolium</i>
- <i>Acer montano</i>	(endemit)	- <i>Crataegus monogy'na</i>
- <i>Acer campestre</i>	- <i>Rosa canina</i>	
	- <i>Rosa sempervirens</i>	- <i>Taxus baccata</i>

The word Nebrodi derives from the Greek "Nebros" (fawn), once, in fact, this area was the kingdom of these herbivorouses, and many important mammals. Due to the poaching and the progressive impoverishment of the fauna, the XIX century has seen the extinction of some important species such as: [4]

- <i>Cervus elaphus</i>	- <i>Canis lupus</i>	- <i>Bubo bubo</i>
- <i>Dama dama</i>	- <i>Capreolus capreolus</i>	

Walking through the Nebrodi Natural Park it should not be difficult to meet different types of mammals [4]:

- <i>Sus scrofa</i>	- <i>Hystrix cristata</i>	- <i>Glis glis</i>
- <i>Vulpes vulpes</i>	- <i>Lepus corsicanus</i>	

But also, reptiles such as tortoises, and about 150 species of birds, including:

- <i>Testudo hermanni</i>	- <i>Falco peregrinus</i>	- <i>Tachybaptus</i>
- <i>Emys trinacris</i>	- <i>Milvus milvus</i>	<i>ruficollis</i>
- <i>Lacerta bilineata</i>	- <i>Aquila chysaetos</i>	- <i>Alcedo atthis</i>
- <i>Ardea cinerea</i>	- <i>Fulica atra</i>	- <i>Corvus corax</i>
- <i>Himantopus</i>		- <i>Upupa epops</i>

Many amphibious species:

- <i>Discoglossus pictus</i>	- <i>Rana esculenta</i>
- <i>Bufo siculus</i>	

Valdayskiy Natsional Park, on the other hand, is located in the northern part of the Valday Hills, the only highland in the vast plains dividing Moscow from St. Petersburg, which houses 76 lakes. [1]

The climate is continental-temperated, with moderately warm summers and quite cold winters. [5] There are approximately 128 days of frost each year. The absolute minimum temperature is -47/-54 °C. During summer the absolute maximum temperature is + 33°C. [2]

The Park area is chacterized by a complex of Paleozoic rocks, covered by a layer of sediments from the Quaternary period, mostly made up of morainic deposits. [2]

Besides, the forest occupies the majority of the park, approximately 90% of the total surface area. [6] Examples of species that can be found are: [2]

- <i>Hericum</i>	- <i>Cypripedium</i>	- <i>Dactylorhiza</i>
<i>coralloides</i>	<i>calceolus</i>	<i>baltica</i> ^[1] _[SEP]
- <i>Lobaria</i>	- <i>Liparis</i>	- <i>Orchis</i>
<i>pulmonaria</i>	<i>loeselii</i>	<i>ostulata</i>
- <i>Isoetes</i>	- <i>Cladium</i>	- <i>Orchis</i>
<i>lacustris</i>	<i>mariscus</i>	<i>militaris</i>
- <i>Armeria</i>		
<i>vulgaris</i>		

But the ones that characterize the park the most are:

- *Viola serkirki*, a perennial plant of the violets' family
- *Clematis recta*, growing under a fern cover
- *Hottonia palustris*

- *Daphne mezereum*, called “Fiore di stecco” as it generates flowers on the branches, apparently dried. But its appearance is misleading: its fruits contain a deadly poison. [2]

The territory’s fauna, on its side, hosts approximately 50 species of mammals, at least 180 species of birds, 5 different species of reptiles, 7 of amphibious species and between 40 and 45 species of fish.

The mammals that can be found in the park are: [2]

- <i>Moose</i>	- <i>Wolves</i>	- <i>Beavers</i>	- <i>Foxes</i>
- <i>Bears brown</i>	- <i>Hares</i>	- <i>Squirrels</i>	

Its most common reptiles include:

- *lucertola* (lizard)
- *basilisco* (basilisk)

Among amphibious species we can find:

- *Rospo grigio* (Gray toad)
- *Rana comune* (common frog)

The ichthyofauna is mainly made up of:

- *common catfish* - *carp*
- *common eel* - *trout*

Most of the most common bird species in the park include:

- <i>Aquila chrysaetos</i>	- <i>Haematopus ostralegus</i>	- <i>Pandion haliaetus</i>
- <i>Aquila clanga</i>	- <i>Lanius excubitor</i>	- <i>Bubo bubo</i>
- <i>Gavia arctica</i>	- <i>Falco peregrinus</i>	- <i>Ciconia nigra</i>
- <i>Circaetus gallicus</i>		- <i>Pluvialis apricaria</i>

Both parks, in conclusion, show extremely peculiar features in their bioclimate and geomorphology. Furthermore, it represents a starting point for the discovery of new horizons, which are too far from ours.

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Cherepenina D.A.

DIVERSITY OF LICHEN BIOTA AS AN INDICATOR OF THE STATE OF THE MOSCOW REGION PARK COMMUNITIES. CASE STUDY OF THE PARK OF THE MUSEUM-RESERVE "ABRAMTSEVO"

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Abstract: The article considers diversity of lichen biota as an indicator of the state of the Moscow region park communities. The study examined the species diversity of the lichen biota of the museum-reserve «Abramtsevo». Taxonomic, ecological and zoological analyses of the investigated lichen biota have been carried out. On that basis, an assessment of the state of the lichen biota and the park community has been made.

Key words: epiphytic lichen biota, indicator, diversity, museum-reserve "Abramtsevo".

Introduction. Pollution of the environment and recreational pressure affect the state of the park communities of the Moscow region. They cause anthropogenic transformation and degradation of park

communities. The species diversity of epiphytic lichens, the ratio of their ecological-substrate groups, groups in relation to the pH of the forrophytes bark or in relation to humidity, rare species can serve as indicators to determine the level of anthropogenic transformation of park communities [1]. Thus, the diversity of epiphytic lichen biota can be used as an indicator of the state of park communities.

The museum-reserve "Abramtsevo" is located 60 km northeast of Moscow, near the town of Sergiev-Posad on the right bank of the Vorya River [2]. "Abramtsevo" is situated in the subzone of coniferous-broad-leaved forests.

In the park, five points were surveyed and samples of epiphytic lichens were collected. The collection and laboratory processing were carried out according to conventional methods [3, 4].

Taxonomic analysis. As a result of the research, 55 species from 30 genera that are included in the 17 families of lichens and allied non-lichenized fungi (+) were found (Table 1).

Table 1. Taxonomic composition of epiphytic lichens of the park of the museum-reserve "Abramtsevo"

Familia	Number of genera / species	Genus	Number of species
Arthopyreniaceae	1/1	+ <i>Mycomicrothelia</i>	1
Caliciaceae	1/1	<i>Amandinea</i>	1
Candelariaceae	1/1	<i>Candelariella</i>	1
Cladoniaceae	1/5	<i>Cladonia</i>	5
Coniocybaceae	1/2	<i>Chaenotheca</i>	2
Fuscideaceae	1/1	<i>Fuscidea</i>	1
Lecanoraceae	2/7	<i>Lecanora</i> <i>Myriolecis</i>	6 1
Naetrocymbaceae	1/1	+ <i>Leptorhaphis</i>	1
Ophioparmaceae	1/1	<i>Hypocenomyce</i>	1
Parmeliaceae	8/14	<i>Evernia</i> <i>Hypogymnia</i> <i>Melanelixia</i> <i>Melanohalea</i> <i>Parmelia</i> <i>Parmeliopsis</i> <i>Usnea</i> <i>Vulpicida</i>	2 2 2 3 1 1 2 1

Phlyctidaceae	1/1	<i>Phlyctis</i>	1
Physciaceae	4/9	<i>Phaeophyscia</i>	1
		<i>Physcia</i>	4
		<i>Physconia</i>	3
		<i>Rinodina</i>	1
Ramalinaceae	3/4	<i>Biatora</i>	1
		<i>Ramalina</i>	2
		<i>Lecania</i>	1
Scoliciosporaceae	1/1	<i>Scoliciosporum</i>	1
Stereocaulaceae	1/1	<i>Lepraria</i>	2
Teloschistaceae	1/1	<i>Xanthoria</i>	1
Tephromelataceae (Mycoblastaceae)	1/1	<i>Violella</i>	1
Total:	17	30	55

The park of the museum-reserve "Abramtsevo" as well as the National Park "Elk Island" are located in the Moscow region and in the same natural subzone of coniferous-broad-leaved forests, therefore it is possible to make a comparative analysis of the species diversity of the lichen biota on these territories. The species richness of the epiphytic lichen biota of the museum-reserve park can be assessed as high, as its area is 48.74 hectares, while in the National Park, with an area of 12881 hectares, only 58 lichen species were discovered [5].

Ecological analysis. There are no obligate epixyls and epigeics in the studied lichen biota compared to the forest communities of the coniferous-broad-leaved subzone. "Falling out" from the spectrum of these groups is due to the conditions of a well-groomed park with a predominance of deciduous trees, with no dry and rotting wood (dead wood and stumps are cleaned) and unturfed soil.

The distribution of ecological groups in relation to humidity indicates a stable microclimate with a sufficient level of moisture and naturally reflects the conditions of the surveyed area.

The distribution of ecological groups in relation to the illumination factor naturally reflects the conditions of the surveyed territory: the presence of shaded and more or less illuminated habitats, which is usual for a park community with regular avenues and open spaces around buildings and ponds.

At present, a scale of nitrogen pollution based on the percentage of acidophytes on oak trunks has been developed [1]. Acidophytes live

on forrophytes with "acidic" indicators of the bark (pine, oak, birch). As for the scale of nitrogen pollution based on the percentage of acidophytes on oak trunks, there is significant nitrogen contamination probably associated with some economic activities (maybe fertilizing).

Sozological analysis. Four species new for the Moscow region were found: *Fuscidea arboricola*, *Myriolecis persimilis*, *Mycomicrothelia confusa*, *Violella fucata*; also 5 species listed in the Red Book of the Moscow region were found: *Hypogymnia tubulosa*, *Ramalina farinacea*, *Ramalina pollinaria*, *Usnea dasypoga*, *Usnea subfloridana*.

In conclusion. The spectrum of ecobiomorphs of the lichen biota is complete, there are warty or scaly-bushy and bushy life forms, as well as species of natural forest lichen biota. That characterizes the state of lichen biota as the best. The presence of 36.8% acidophyte in the epiphytic lichen cover, the slow growth of thallus, and the poor vitality of rare bushy and leafy species indicate a change of environmental parameters in the park compared to natural forest communities. Changes are caused by some pollution (including nitrogen) and dusty air, as the surveyed territory is located in an area with a moderate degree of man-caused load. As a result, the state of the park community can be assessed as good.

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Dabbagh Alaa

The role of Psammophytes in the stabilization of sand slopes (Ecological characteristics)

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Abstract: Vegetation self-restoring in sand pits is a long and difficult process.

To prevent the movement of slopes of man-made landforms, it is necessary to thoroughly study their vegetation. Psammophilia species are studied as well adapted for substrates with fine granulometric composition, washing regime and a high degree of aeration. The features of life activity and the external appearance of such species are strongly affected by the ability of sand to move.

Key words: Psammophytes; sand slopes; stabilization; additional roots.

Introduction. Psammophytes are plants adapted to life on mobile sands both because of a long rhizome and the root enclosures from sand grains [3]. Psammophytes can be divided into two large groups according to the location of the root system. The first group develops the main root which finds water at considerable depths (20-30 m), forming lateral roots of an impressive length. Plants belonging to the second group have a surface distribution of roots for effective

capture of rainfalls. In both cases, a set of underground layers is formed by strong roots system.

Xeromorphism is a characteristic feature of psammophytes: they are able to adapt to the constant water deficit [3]. Generally, it is manifested by aboveground parts of the plants with a coating wax (*Leymus racemosus*), pubescence, such plants are often dry (*Helichrysum arenarium*) [3]. It can manifest itself as well in the reduction of the leaves number and size, and in the increase of stems volume when it begins to perform transpiration, photosynthesis, and also store moisture (for example, *Haloxylon*).

Psammophytes' ecological features:

1. Light effect. Mostly, Psammophytes are heliophytes growing in open places with full sunlight: providing them with more light leads to better development and they may occupy ecological niches on sandy substrates. Hot deserts are relevant to this group. *Pinus sylvestris*, *Betula pendula*, *Tussilago farfara* are typical heliophytes – fleshy, squat, with short internodes to shape a rosette form of growth. Short internodes are combined with branching (pillow-like form of growth); xylem and mechanical tissues are well developed.

2. Temperature effect. The sands are cooled rapidly since they have a low heat capacity [3]: heated surface and adjacent air lead to sharp fluctuations in temperature during the day [1]. High thermal conductivity of the sandy soils is due to the fact that the soil particles are large. Psammophytes' thermal endurance is caused by specific biochemical processes: a number of adaptations lead to water mobility decrease, to cytoplasm viscosity and protective substances increase and to a change in the state and composition of proteins in the cell.

2. Soil moisture. Sandy soils are the least water-intensive: they quickly get wet during rain, but also quickly release moisture, especially from the upper horizons. Sands do not retain moisture: its reserve (wilting coefficient) is about 0.5-1.5% of the dry soil weight [3]. In any case, if a plant is experiencing water supply difficulties, it reduces transpiration with the help of the root system. Tissues of Psammophytes species accumulate moisture; a combination of intensive transpiration with highly watered leaves can be noted [1].

3. The wealth of soil. Sandy substrates are characterized by a washing mode and a weak absorption of complex components. Ventilation system is an advantage, poverty of organics instantly

decomposed in the sand is an unfavorable factor. Due to the influence of low moisture, high temperature of surface air, sand mobility, psammophytes do not form a cover, they are dwarfed and their groups are scattered. On the other hand the underground organs are more developed and became close [2].

5. The effect of substrate mobility on the plants

Perhaps the most important ecological feature that makes psammophiles is the mobility of sand, which is explained by the weak connection of individual particles of the substrate. Wind or water easily moves the grains, leading to, the denudation of the roots from the downwind side, and to falling them asleep on the opposite side [2].

Root dedundation is a direct way to the plant drying, so psammophytes developed a special way of protection: they have the ability to rapidly form additional roots from the stem at any height and also long horizontal rhizomes that penetrate the sand and carry the buds of renewal to the surface (as *Carex arenaria*). No matter how quickly the additional roots grow, the psammophyte organs are constantly threatened with drying and mechanical damage. To meet the challenge plants start to form a thick crust, and some species (such as *Aristida karelinii*) excrete mucus or cork to cover the sand, forming a kind of a case on the roots.

Conclusions. Psammophytes falling asleep with a sandy substrate can quickly form additional roots and vegetative shoots. They grow rapidly, with either a branched or deeply penetrating root system. Being resistant to drought and mechanical damage, they improve soil properties leading to the stabilization of sand slops.

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PROCESSING OF AGRICULTURAL WASTE IN VIET NAM

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Abstract: There are a lot of options available to us in the treatment of solid waste. One of the most problematic and dangerous ways in our view is to dig a hole and bury it. The article is a synthesis of agricultural waste treatment technologies applied in Vietnam.

Key words: sustainable development, agricultural waste management, organic waste treatment.

Since the 90 years. management in the field of waste management received much attention from the Communist Party and the government. Many environmental laws have been drafted, the main ones being the Environmental Protection Act 1994, with changes in 2005. The country also has a state strategy for the protection of the environment until 2010 and an action plan until 2020. There is also a state strategy for integrated solid waste management up to 2025 with a vision until 2050.

The new law on environmental protection was adopted at the national meeting on June 23, 2014 and entered into force on January 1, 2015. After that, Decree No. 38/2015 / NĐ-CP of 24 April 2015 on the management of consumption and production was issued. However, for solid rural agricultural waste, today there are no clear bases or integrated schemes to reduce their environmental impact. Recently, we have tried to create different models of rural production without waste or little waste.

In Vietnam recently composting technology has been widely used for the processing of crop waste into organic fertilizer. Compost is created by herbs in combination with such materials as bamboo sawdust, bamboo charcoal, covered with non-woven material Toptex.

Composting destroys pathogenic microorganisms, as some thermophilic bacteria create favorable conditions for the dominance of other beneficial bacteria that will eradicate pathogens. About 3 tons of raw plant materials gives 1 ton of fertilizer.

Another model of integrated pig production in the village of Van Lung, in the province of Phu Tho, combines pig breeding with the processing of pig waste using EM technology, creating a biological bedding (Picture 1). This litter is a living environment for microorganisms that digest feces and urine swine. To do this, use materials, mainly this sawdust, or materials "inert", like husks, coconut peat, peanut shells, crushing corn cobs crushing. Spray the effective microorganisms containing biological preparations (EM) on the litter surface. In particular, the microbial protein obtained in the process of bioconversion of faeces, urine, is also an ecological food for pigs. This technology also makes it possible to reduce the smelly smells in pigs [1].



Picture 1: Biological litter for pigs

Another technology, widely used in the processing of animal wastes in Vietnam, is the utilization of liquid manure (litter) with the production of biogas.

Biogas is widely used as fuel oil in Germany, Denmark, China, the USA and other developed countries. It is supplied to gas distribution networks, used for domestic purposes and in public transport. Today the wide introduction of biogas technologies in the markets of the CIS and the Baltic countries begins.

Biogas technology was studied and applied in Vietnam for the first time in 1960. This technology has received special attention among the country's research organizations (Energy Academy, leading polytechnic universities in Ha Noi, Ho Chi Minh, Da Nang, and Can Tho) [2]. Today, about 150 000 biogas plants have been built in the country [3].

Since 2004, Vietnam has conducted a series of studies on the use of worms in the processing of organic waste. The main kind of worms that is applied is *Perionyx Excavatus*. According to the results of Huynh Thi Kim Hoi (Institute of Ecology and Biological Resources) experiments, 1,000 individuals of F1 worms and their descendants are needed to dispose of 1 ton of organic waste per year [4].

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**THE MORPHOLOGICAL STRUCTURE OF
STOMATA LEAVES IN «KOLOMNA» MSW
LANDFILL**

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Abstract: The study is devoted to the morphological structure of stomata leaves in the special technogenic ecosystem - Kolomna MSW landfill, particularly to identify length and width of stomata leaves in different tree species, which are growing on two sites, the one of which is located in vicinity of the sanitary protection area, the second is placed within the protection area.

Key words: MSW landfill, solid waste, waste management, sanitary protection area, stomata leaves, closing cells, tree species, plant community.

Introduction. Stomata are the special holes on epidermal tissue of plant, which serves for transpiration and photosynthesis processes. Also, stomata can capture pollution components which are dust, CO, NO₂, SO₂, H₂S, CH₄ and others [1]. These pathogenic compounds disrupted photosynthesis and transpiration processes in stomata leaves [2].

The study of morphological stomata leaves in Siberia showed, that the number of stomata and closed stomata leaves, which are growing under pollution prolonged conditions, has increased [3]. This fact can be explained by appearance of xerophytic characteristics of plants. However, such adaptive properties do not concern all plant species. Many trees, especially coniferous species, particularly *Pinus*



pinea, which are growing in pollution area, have got a smaller stomata aperture, than the other trees of *Pinus pinea*, which are growing in wildlife [4]. This fact could be elucidated by the movement of closing cells, which surround a stomata aperture.

Under environmental changes (temperature and wet parameters, pollution and etc.) stomata closing cells are compressed and always die, meanwhile they get bigger and more viable in wildlife. This thesis was proved by K. Esau in 1977 [5], when he investigated stomata leaves in the town. But at that time, the problem of morphological and anatomical parameters of stomata leaves near MSW landfill was not revealed. Consistent with this, analysis of epidermal tissue and stomata leaves structure could provide an estimate of environmental change in MSW landfill.

Methods. Experiments were carried out in summer (during of July-August) 2017. Morphological structure of stomata leaves was controlled in two different areas, one of which (experimental area) was placed near «Kolomna» MSW landfill, and the other (controlled area), was situated far away: 1000 m from «Kolomna» MSW landfill (fig.1).

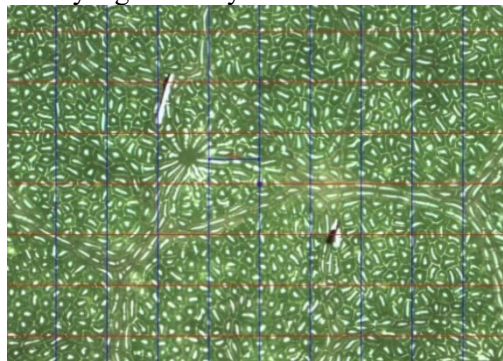


Figure 1. Experimental and controlled area near «Kolomna» MSW landfill

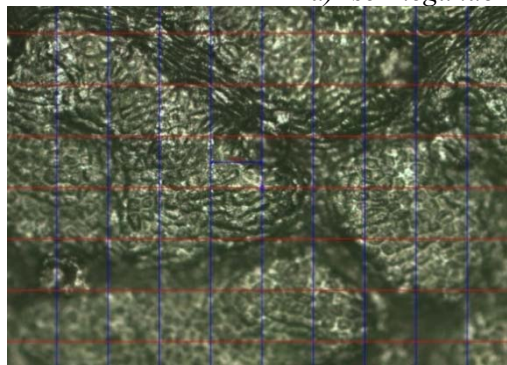
Explanations:  «Kolomna» MSW landfill
 Experimental and controlled area

In these areas we identified plants species, according to S. Cherepanov [6]. After that, we collected ten leaves from trees which were growing in experimental and controlled areas. For microscopic examination we used microscope Nikon eclipse LV 100 ND, with 10 x, 20x and 100x zoom. Identification of morphological structure of stomata leaves conducted by microbiological method, was described in Weikang Zhang study [7]. As a result, we described width and length of stomata (three stomata per one leaf). The total number of measurements in the data set was 360.

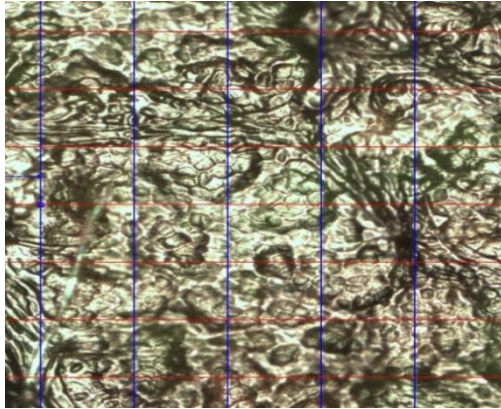
Results and discussion. As a result, we identified three trees species in experimental and controlled areas (*Acer negundo*, *Betula pendula*, *Salix caprea*). Photos of stomata leaves are shown in fig. 2-3. It is noted, that these pictures present only some microscope photos of stomata leaves. As we can see, the number and morphological structure of stomata leaves vary significantly.



a) *Acer negundo*

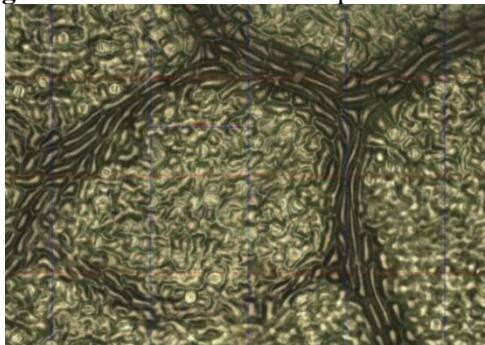


b) *Betula pendula*

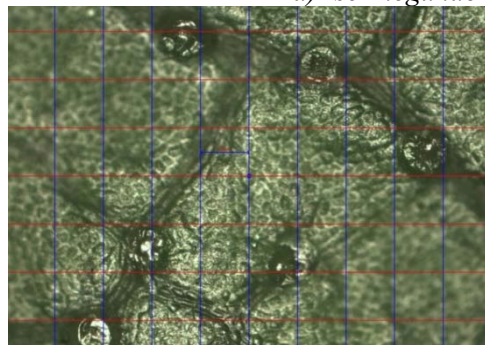


c) Salix caprea

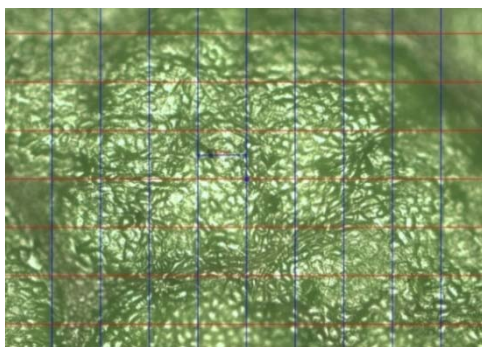
Figure 2. Stomata leaves in experimental area



a) Aser negundo



b) Betula pendula



c) *Salix caprea*

Figure 3. Stomata leaves in controlled area

It is noteworthy, that stomata leaves of *Aser negundo* examined in the experimental area had bigger length and width (by 5-6 μm at an average of the data set), than stomata leaves growing in the controlled area. Stomata length and width of *Betula pendula* in experimental and controlled areas were always the same. The length and width of stomata *Salix caprea* in the experimental area were continuously disrupted. In addition, the stomata aperture was always closed. Decreasing morphological parameters and cell death could be initiated by air pollution. We also found increased concentration of greenhouse gases (CO_2 , NO_x) and particulate matter in the experimental area.

In conclusion, we can see that the morphological structure (length and width) of stomata leaves in experimental and controlled areas, had a lot of distinctive features. We also assume that these features are linked to air concentration (especially air pollution), plant species, climatic condition and others parameters.

Recommendations. Subsequently, we try to organize long-term observation of data and analyze the correlation between parameters.

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ESSENTIAL ENVIRONMENTAL PROBLEMS IN THE REGIONS OF RUSSIA AND IN THE WORLD

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ENVIRONMENTAL PROBLEMS IN THE DEVELOPMENT OF SHELVES IN THE ARCTIC

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Abstract: The analysis of problems in the development of offshore deposits is carried out in this article taking into account important environmental factors.

Key words: environmental problems, ecological, arctic shelves.

At the present time, there are some alternative types of development of the oil deposits, which were very actively considered, and technologies for their development become more complicated. New fields are being discovered, but they need more modern and innovative methods of increasing oil intensification. However, the more complex technologies of oil production can make more difficult environmental problems for the territory where oil is extracted. Such a place is the Arctic.

The decline in the reserves at known deposits around the world, the growing demand for oil and melting glaciers has led to a significant increase in the volume of geological exploration in the Arctic. Works that are conducted by oil companies on the Arctic shelf can cause irreparable damage to the fragile ecosystem of the unfamiliar part of the planet.

As we know, Arctic climatic conditions are not easy for their developers. Here, very low temperatures, limited visibility, sudden

gusts of wind, storms are a source of problems with equipment. Snowfalls, polar nights, wind facilitate the mixing of ice fields and dispersion of oil pollution. In the stages of storage and transportation, oil spills can occur which will be difficult to clean due to complicated conditions. [1].

For example, the incident occurred in March 24, 1989 near Alaska, the Exxon tanker collided with the Blyth Reef. As a result of the accident, more than 250 thousand barrels of oil spilled into the sea, forming a huge oil patch with a length of 28 thousand km. Due to the difficulty of locating the area of the accident, quickly getting to the place that happened was impossible. Several attempts have been made to burn oil from the stationary pool of the spill. The attempt was successful, however, only a part of it burned down. The absence of waves interfered with the mixing of the oil with the dispersant, so the use of the dispersant was discontinued. Due to low temperature conditions and strong wind, oil burning was impossible, and mechanical cleaning of oil did not bring any results. Algae and a thick, frozen layer of oil clogged up the equipment. In this regard, it was decided to use the microbiological method. Removal of oil by hot water with *Desulfobacter* bacteria, *Desulfobulbus*, *Pseudomonas methanica* var. *Scissa*, etc. [2]. Under high pressure, most of the hydrocarbons were removed from the shoreline, because bacteria are oil destructors and oil is their main nutritional composition [3].

The development of the Arctic shelf requires great responsibility and the availability of large resources, so that in the event of an accident or complications there will be a possibility to rectify the situation.

Health and Safety: Extremely low temperatures, severe storms and thick ice cover render the Arctic inhabitable. Working in this type of environment is a treacherous task and poses high safety risks. Stringent health and safety policies have to be enforced.

The presence of rare and endangered species, fisheries, and the slow environmental impact recovery makes the Arctic an environmentally sensitive area.

The ecological basis of sustainable development of the Republic of Kazakhstan is environment protection and conservation of biodiversity [4]. So the same concerns other countries too. Construction, installation of facilities can be carried out only with technologies that ensure the

collection of all types of pollutants. Equipment should be based on progressive practices and international practice, and the main position must be environmental protection.

The development of the continental shelf is characterized by difficult working conditions and requires the use of new and modernized technologies. If the world oil and gas industry is able to follow the rules in the existing areas, we will soon be able to observe the improvement in the dynamics of the development of the Arctic shelf.

Establishment of special modes for environmental management and environmental protection, including monitoring of its pollution; reclamation of natural landscapes, utilization of toxic industrial wastes, ensuring chemical safety, primarily in residential areas of the population.

The experience of the past years gives us an example of the fact that the fight against oil spills in freezing waters is "almost impossible, and inevitable mistakes can destroy the fragile Arctic environment.

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**DYNAMICS OF GLACIERS OF THE ALA-ARCHA RIVER
BASIN (KYRGYZSTAN)**

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Abstract: In the last few decades, according to the results of instrumental observations, there has been a noticeable reduction in the mountain glaciation of the Tien Shan. The investigation of the dynamics of the glaciation of the Ala-Archa valley makes it possible to study these changes in more detail.

Key words: Ala-Archa, Tien Shan, glaciation area, glacier, mass balance, reduction.

According to the Second National Communication of the Kyrgyz Republic on the United Nations Framework Convention on Climate Change, held in 2009, for Kyrgyzstan as a whole, the glaciation area is projected to decrease from approximately 64% to 95% from 2000 to 2100 [1]

The valley of the river. Ala-Archa is located on the territory of Ala-Archa National Park (Kyrgyzstan) and is an important source of glaciation in the Northern Tien Shan.

According to data on the different areas of glaciation in the Ala-Archa basin, the basin glacier area was estimated at 42.83 km² for 1963, 40.62 km² for 1981 and 36.31 km² for 2003. Consequently, from 1963 to 1981, The area of the glaciers in question decreased by 5.16% (average annual reduction rate of 0.29%), from 1981 to 2003. - by 10.6% (average for the year 0.48%), and from 1963 to 2003. - by 15.2% (the average for the year is 0.38%). It can be seen that in the second period of time the average annual rate of shrinkage of the glacier area increased by approximately 1.7 times. It can also be noted that the presented results confirm the above data on the change in the mass balance of glaciers. [2]

Work was done to decipher ArcGis with two space images (1977 and 2015). The areas of 26 glaciers located in the Ala-Archa valley were identified with a total area of 37 km².

The ten largest glaciers in the Ala-Archa basin are shown in the graph (Figure 1). The largest glaciers with an area of more than 5 km² are the valley glaciers of Golubin (5.569 km²) and Aksai (5.351 km²). Next are Tuyuk glaciers with an area of more than 4 km² and glaciers of Adygene and Top Karagai, whose area exceeds 3 km². The remaining analyzed glaciers in 1977 had an area of less than 3 km².

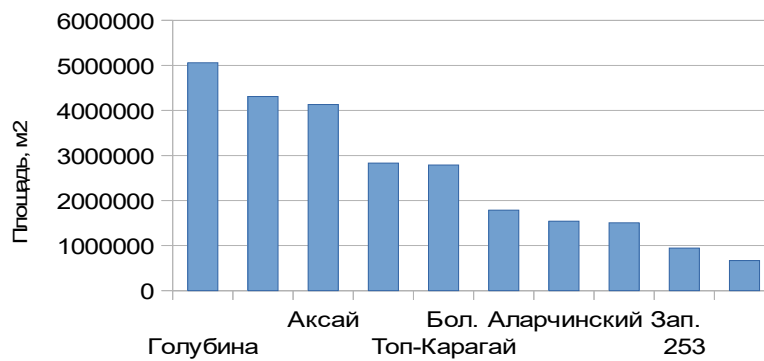


Fig. 1 – Area of the largest glaciers in the Ala-Archa river basin in 1977

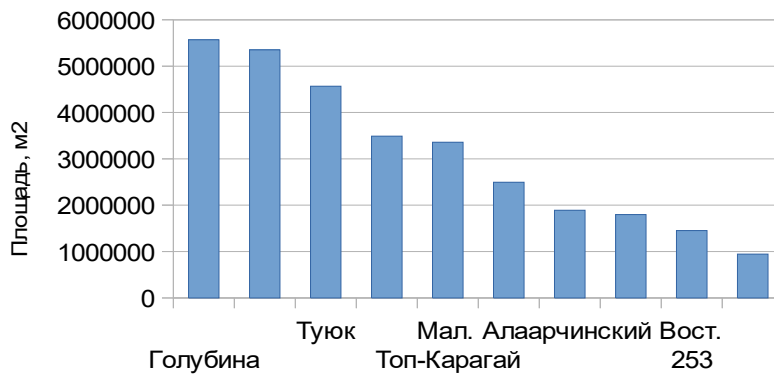


Fig. 2 – Area of the largest glaciers in the Ala-Archa river basin in 2015

By 2015, the total area of the glaciation under analysis has been reduced to 30,075 km². Figure 2 shows how the areas of the largest glaciers have changed. The area of 3 km² by this time is exceeded only by 3 glaciers out of 26: Golubina, Aksai and Tuyuk. And only Golubina, which has decreased to 5,058 km², exceeds the mark of 5 km².

Figure 3 shows how the area of all the glaciers analyzed has changed. The greatest decrease is observed in small glaciers. The smallest reduction in areas is observed in the large glaciers Golubina and Tuyuk.

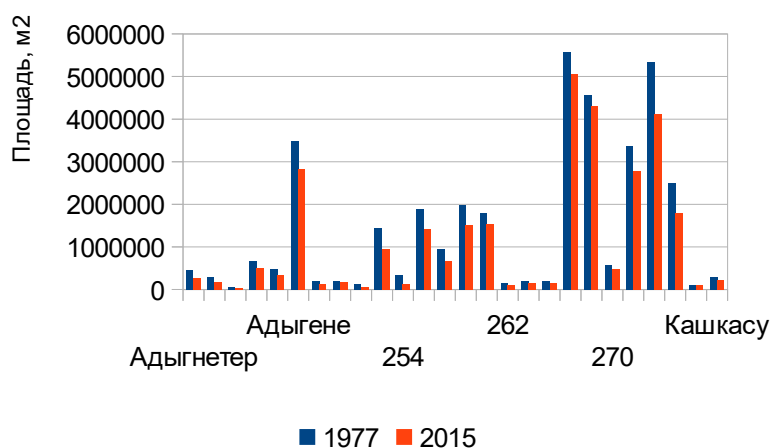


Fig. 3 – Dynamics of glaciers in the Ala-Archa valley

Thus, the area of the Ala-Archa glaciation in the period from 1977 to 2015 was greatly reduced. The degradation of small glaciers is most severe. The largest glaciers of the valley are more stable and reduced by no more than 10-20%.

Despite the fact that the physico-geographical features of the region create favorable conditions for the formation and preservation of glaciation, there is a significant reduction in the area of glaciation.

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**POSSIBILITIES OF SUSTAINABLE DEVELOPMENT IN
SANTA ELENA PENINSULA (ECUADOR, LATIN AMERICA)
BASED ON THE FORMATION OF OIL CLUSTERS**

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Abstract: This paper is concerned with the study of the socio-ecological-economic characteristics of the Peninsula of Santa Elena, and the impact of oil clusters on the sustainable development of the Peninsula.

Key words: sustainable development, Santa Elena, Ecuador, oil clusters.

Introduction. The work of oil-producing companies in Ecuador is one of the main and urgent problems in the country, because the economic pressure on the developing country had contributed to the rapid involvement of raw natural resources in exploitation and their irrational use, while the living standards of the local population remain at the same low level, especially in the peninsula Santa Elena, where the main oil production is located.

Thus, the growth and development of oil clusters reinforce the need to implement a sustainable development strategy in the coast region of the country.

The objective of this research is to assess the impact of the oil clusters on the sustainable socio-ecological and economic development of the Santa Elena Peninsula.

Methodology. To assess the impact of the oil cluster on the development of the region, was developed a model that consists in a system of indicators of sustainable development for the oil cluster and for the peninsula.

Indicators for the oil cluster were selected in such a way that it was possible to assess the quality of environmental protection management, impacts on the natural environment, ecological efficiency of the cluster, environmental transparency, company's contribution to environmental protection, level of associated gas utilization and the management of formation water.

In order to identify and assess how much the region develops steadily in the context of the formation of oil clusters, the indicators were oil reserves, oil quality (API scale), oil export earnings, economically active population, unemployment rate, urban green index and protected areas.

For a more objective assessment, it was considered advisable to compare the indicators of the Ecuadorian company (Pacifpetrol) with the data of the Russian company, which was supposed to respond to a good level of ecological well-being. The company Sakhalin energy served as a basis for the comparison of our indicators, since the results of the Environmental Responsibility Rating of Oil and Gas 2016 took first place.

Results. The main environmental impacts of the oil cluster in Santa Elena on the environment are the increase of water consumption every year, the increase of solid waste volume and the lack of management of the formation and waste water.

The environmental impact of the oil cluster is assessed as satisfactory, because the 30% of indicators have positive values, 40% of indicators can improve their values. The remaining indicators (30%) have the worst values (tab. 1).

From the economic and social point of view, Santa Elena is mostly depends on the oil industry, this is evidenced by economic indicators, such as revenues for oil exports and their derivatives on the budget of the region and country (tab. 2).

The main significance of the activity of the oil cluster is manifested in the development of social programs of the Foundation "Ancon", which contributes to the social development and increase the quality of life of local communities located next to the oil cluster.

Table 1. Comparison of sustainable development indicators for the oil clusters. Eco-efficiency.

Indicator		Measure unit	Ecuador	Russia
			Pacifpetrol	Sakhalin-2
Environmental management		-	1,4285	2
Greenhouse gas emissions	Hydrocarbon production	ton CO ₂ -eq/ton oil produced	-	0,054
	Transportation of hydrocarbons	ton CO ₂ -eq/thousand ton-km	-	0,008
Specific water consumption for the company's own needs.		m ³ / toe	0,47	0,003036
Volume of formation water		MCUM	2,6	-
The ratio of the volume of oil produced to the volume of spilled hydrocarbons.		%	0,0036	0,00000014
Level of utilization of Associated petroleum gas		%	84,37	96,1
The ratio of the volume of oil produced to the waste volume		%	20,9	0,6
Disclosure of information		-	0,4444	1,6667
Investments in environmental protection		Million roubles	7,885 800	2 248

Table 2. Comparison of sustainable development indicators for the oil clusters. Socio-economic indicators.

Indicator		Measure unit	Ecuador	Russia
			Pacifpetrol	Sakhalin Energy (Sakhalin-2)
Oil reserves		million barrels	5,56	1302,85
Volume of oil production		ton	57 129,8	5 100 000
Suppliers of the company	Local	%	97,51	-
	Foreign		2,49	-
Number of victims of accidents at work, всего человек		persons	5	9
Number of programs within the framework of sustainable development		-	17	.

Conclusion. The socio-ecological and economic analysis of Santa Elena peninsula and oil industry within the framework of cluster approach showed a positive influence of the formation of oil clusters on the sustainable development of the Santa Elena peninsula. The positive

impact is due to financial revenues from oil exports, the creation of social programs for the population and a satisfactory environmental impact.

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**ENVIRONMENTAL IMPACT OF GLACIAL CATASTROPHES
IN GENALDON VALLEY ON MATERIALS OF EARTH
REMOTE SENSING**

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Abstract: Application of methods of remote sensing allows continuous monitoring of dynamically unstable glaciers. The pulsation of these glaciers leads to ecological disasters.

Key words: Surging glaciers, snow, ice, Karmadon, Genaldon, Kolka.

Application of methods of remote sensing allows continuous monitoring of dynamically unstable glaciers. The pulsation of these glaciers leads to ecological disasters.

Analyzing the dynamics of the formation of postcatastrophic landscapes in the Karmadon depression was carried out on the materials of space images and data of field research.

Area Glacial catastrophe geographically refers to the Kazbek-Djimarai mountain range, which is located within the Greater Caucasus.

The volcano Kazbek and mount Dzhimarai-Hoch are the highest peaks of the mountain range.

Kazbek-Djimarai mountain range is the largest site of modern glaciation in the North Caucasus. There are 59 glaciers, but 3 of them are pulsating glaciers: Devdoraki, Abano and Kolka.

The ice-water-stone flow destroyed the unique natural landscape in the Karmadon basin.

The main environmental effect from passing IWSS includes:

1. the formation of ice-rock blockage, blocked Karmadon basin on the site of the village of Karmadon gorge to the Rocky ridge.
2. the overlap of the Genaldon and Cowridon riverbeds by landslide masses and the subsequent emergence of dynamic dammed lakes.
3. the destruction of vegetation on the bottom and the sides of the Karmadon depression
4. the destruction of the outputs of the Karmadon thermal mineral springs. [1]

Over the past 15 years after the disaster in the Karmadon depression there have been processes of postcatastrophic landscape formation.

Ice-rock blockage is the largest component of postcatastrophic landscape in the Karmadon depression. In the period from 2002 to the present, the degradation of ice-rock blockage has been going on due to ice melting, precipitation and landslide mass compaction. Analyzing multi-temporal satellite images, it can be concluded that the melting of the ice component was particularly active in the period from 2002 to 2006.

The intensity of the melting processes determines not only relatively high average summer temperatures, but also the development of thermokarst. The melting of the ice component increased the

thickness of moraine cover on the surface of the dam. That has slowed the further degradation of the dam. The recent satellite images show that only in the southern part of the dam there has been an active melting of the ice component, and they also confirm that in 2014 the whole body of the dam was covered with a thick moraine cover, which was important for the recovery of the vegetation. At the moment, the ice-rock blockage, an element of the Karmadon depression ecosystem, is in the state of equilibrium. [2]

The analysis of space snapshots allows to conclude that the vegetation recovery in the upper part of the Karmadon depression is more rapid than at its bottom. This is because there is no promotion on the sides of the hollow ice-rock deposits. The lower part of the basin sides, that used to be free from vegetation, is now covered with trees and shrubs.

Thus, in the Karmadon depression interrelated processes of postcatastrophic landscape formation are going on, namely postcatastrophic succession, almost not complicated by anthropogenic impact and degradation of ice-rock blockage. At the moment the ice-rock blockage, as a component of the Karmadon depression ecosystems, is in a relatively steady state. However, any extreme climatic conditions, seismic and volcanic activities, or human impact can lead to destabilization, with possible catastrophic consequences. [3]

It can be assumed that the final postcatastrophic landscape will have formed in the Karmadon basin by the middle of this century.

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**GREEN CAMPUS PROJECT: ASSESSMENT
AND ANALYSIS OF THE STATE OF THE ENVIRONMENT
IN THE PFUR CAMPUS**

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Abstract: The Green Campus project aims at monitoring the air pollution, noise load and other environmental parameters, as well as assessment of the automobile transport impact on the PFUR campus ecosystem.

Key words: air pollution, environmental monitoring, green university, assessment and of the state of the environment.

Introduction. «Green Campus» project was organized at the PFUR ecological faculty in the spring of 2017. It is implemented by an initiative group of students of the ecological faculty under the guidance of the teaching staff within the scope of maintaining the status of PFUR as the leading «Green» University of Russia.

The project aims at solving the problem of environment quality control on a unique campus territory.

The main goal of the project is collection and analysis of information about the state of the environment on the campus territory: assessment of the air quality, the geochemical soil condition, the noise load, the parameters of the electromagnetic field and vegetation condition. The research is being carried out all year round, that allows to determine the actual technogenic load and to develop recommendations on maintaining a green zone's environmental sound condition.

In the case that we are considering, the main source of pollution is automobile transport. So, the main objective of the research is to assess its impact on the PFUR campus ecosystem.

Research methods. The research has been carried out in several stages with special equipment. At the first stage, in March 2017, we worked with a portable gas analyzer GANK-4 and measured the concentration of some air pollutants, in particular the following:

- Carbon monoxide;
- Nitrogen dioxide;
- Solid particular matter (PM)
- Hydrogen sulphide (H₂S)

We also measured some physical parameter, such as ionizing radiation and noise (with a portable dosimeter and noise-level meter, respectively).

During the cold period, snow can be considered as a repository environment. The accumulation of pollutants occurred for four and a half months (from November to March). So, besides the straight measuring of pollutants' concentrations in the air, we sampled the snow. The samples were melted in the room without special heating or mixing; the water was filtered in the laboratory to examine the presence and quantities of pollutants in it. [1] [2]

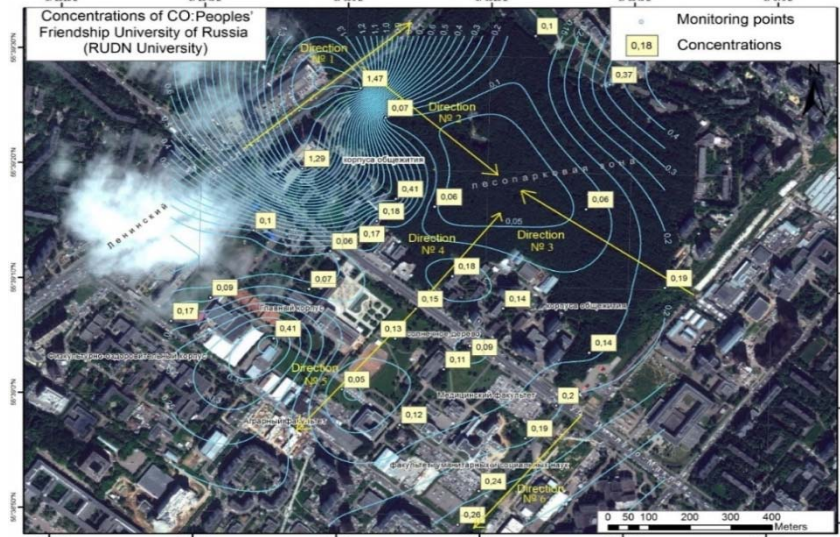
Results. We analyzed the obtained concentration values and found out that they exceeded the maximum permissible concentrations [3] for nitrogen dioxide and particulate matter. The noise levels were also excessive in comparison with the standards.

Table 1. Comparison of measured pollutants' concentrations and noise levels with the standards.

Compound	MPC (daily average) or level limit (for noise)	Concentration values
NaO ₂	0,04 (mg/m ³)	0,07-1,08 (mg/m ³)
Hydrogen sulfide	-	0,0012-0,0021 (mg/m ³)
Soot	0,05 (mg/m ³)	0,01-0,06 (mg/m ³)
Noise	45 дБ	35-81 dB
CO	3 (mg/m ³)	0,05-1,47 (mg/m ³)

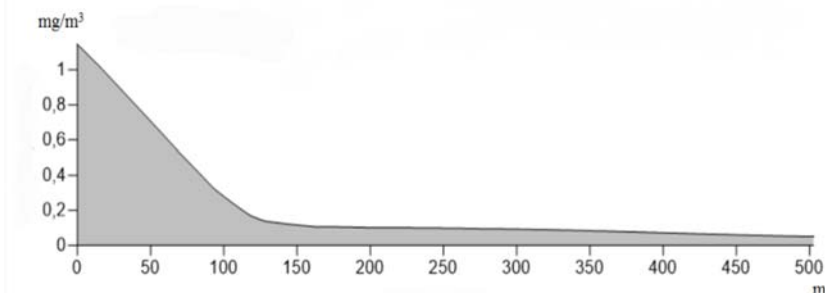
The data is displayed on the maps, where the dynamics of concentration variation is shown by contour lines [4]. The lines were formed using computer program ArcView for each of the key

substances separately. The data on carbon monoxide is given below as an example.



Pic.1. Contour lines for carbon monoxide (the arrows show the general profile directions)

In addition, we established six general directions on the map (pic.1). For each direction we formed the graphs in the Surfer computer program, where x-axis data shows the distance and y-axis – the changes of pollutant concentration. This method enables to see the pollutant path of propagation. As an example, there is the graph on carbon monoxide below.



Pic.2. Change of carbon monoxide concentration from Leninsky Avenue to South-West Forest Park (direction № 2 on the map)

Conclusion

There are two major sources of pollution: the main one is the crossing of Leninsky Avenue and Miklukho-Maklaya street. The second source is the car parking near the PFUR main building.

The excess of maximum permissible concentrations and levels was identified for nitrogen dioxide, PM and noise. There is no excess for other pollutants; the radiological situation is also favorable. Two major sources of pollution were determined: the main one is the crossing of Leninsky Avenue and Miklukho-Maklaya st., the second is the car parking near the PFUR main building. It can be explained by a heavier traffic flow at the crossroad. In addition, some contribution is made by the bus stops, which are located near the campus.

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**EVALUATION OF THE SAFETY AND QUALITY OF
CONSTRUCTION OF COMMUNICATION TUNNELS BASED
ON EXPERT ANALYSIS OF DESIGN DECISIONS**

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Abstract: The proposed solution evaluation of projects for the construction of communication tunnels based on the use of expert assessments of the possibility and degree of influence of uncertainties on the integral parameters of the project is present in the article. This work gives examples of creation of expert rules based on fuzzy formalisms.

Key words: project, communication tunnel, security, environmental security, uncertainty, risk.

Introduction

Construction of underground structures includes a number of geotechnical risks, which the project participants, the funding and performing construction, require qualitative and quantitative analysis. The adoption of a decision depends on many objective and subjective conditions and factors. To consider all conditions and factors, and then actively to influence them, is not always possible, i.e. there is the uncertainty of the forecasting situation.

Methodology

Considering engineering and technological features of the construction of communication tunnels, and especially the environment of the project (major city, dense underground and surface development, high population density, etc.) such factors as uncertainty geological uncertainty factor (F_1), the factor of uncertainty of site conditions (F_2) and structural uncertainty (F_3) should be identified.

Assessment of the impact of the uncertainty factors F_1, F_2, F_3 on the integrated project performance K_j (C - the cost of construction, T - construction period, E - reliability and safety implement is being solved a comprehensive evaluation of fuzzy risk (R)) in the context of the problem.

In this case fuzzy risk is defined as the subjective probability that the result of the influence of uncertainty factors F_1, F_2, F_3 will occur a

deviation of the design value of the integral indicator of the total actual

Evaluation of the fuzzy risk is a combination of influence (V) uncertainty factors for integral indices and the degree of this effect (Z).

The possibility of influence of uncertainties on the integral parameters of the project in the same conditions of the construction site is different for different structural solutions, and the degree of influence of uncertainties on integrated indicators will be different for different versions of the project implemented in the same conditions, only when these variants differ in construction technology. Thus, it can be argued that there is some dependence of V on design parameters of the project, and Z from the conditions in which to perform the construction of the communication tunnel and the technology used:

$$V_{F_i K_j} = f(S); \quad (1)$$

$$Z_{F_i K_j} = f(U, G). \quad (2)$$

In the conditions of the given problem to construct an accurate model of dependence is not possible because there are no objective estimates and sufficient statistics, so here is only applicable to expert evaluation methods.

Hence a comprehensive risk assessment of the design option according to all uncertainties for all integral indices will be found on the basis of the values of the components of the matrix elements of the expert assessment of influence and impact:

$$V = \begin{bmatrix} \nu_{F_1 K_1} & \nu_{F_2 K_1} & \nu_{F_3 K_1} \\ \nu_{F_1 K_2} & \nu_{F_2 K_2} & \nu_{F_3 K_2} \\ \nu_{F_1 K_3} & \nu_{F_2 K_3} & \nu_{F_3 K_3} \end{bmatrix}, Z = \begin{bmatrix} Z_{F_1 K_1} & Z_{F_2 K_1} & Z_{F_3 K_1} \\ Z_{F_1 K_2} & Z_{F_2 K_2} & Z_{F_3 K_2} \\ Z_{F_1 K_3} & Z_{F_2 K_3} & Z_{F_3 K_3} \end{bmatrix} \quad (3)$$

where: ν – value of influence of the i-th element of uncertainty to the j-th integral parameter; Z – the value of the degree of influence of the i-th element of uncertainty to the j-th integral parameter.

According to the chosen risk factors based on a formalized description of the project formed a training table for building a fuzzy rule base, where on the basis of expert opinions determined the possibility of the influence of the uncertainty factor (F_i) on the integral indicator (K_j) – (table.1) and the degree of influence of the uncertainty factor (F_i) on the integral indicator (K_j) - (table.2).

Table 1. The estimation of the influence of the uncertainty factor (F_i) on the integral indicator (K_j)

LS	A ₁	...	A ₆	$V_{F_i K_j}$
1	a_{11}	...	a_{61}	$v_{LS 1}$
2	a_{12}	...	a_{62}	$v_{LS 2}$
...
n	a_{1n}	...	a_{6n}	$v_{LS n}$

Table 2. Assessment of the degree of influence of the uncertainty factor (F_i) on the integral indicator (K_j)

LU	P ₁	...	P ₉	h_{GF_i}	$Z_{F_i K_j}$
1	p_{11}	...	p_{91}	h_1	$z_{LU 1}$
2	p_{12}	...	p_{92}	h_2	$z_{LU 2}$
...
z	p_{1z}	...	p_{9z}	h_z	$z_{LU n}$

where: LS_x – line training table, by definition, $P_{F_i K_j}$ ($= 1$ rule), $x = \overline{1, n}$; LU_y – line training table, by definition, $Z_{F_i K_j}$ ($= 1$ rule), $y = \overline{1, z}$; h_{GF_i} - resistant technology to the uncertainty factor F_i , defined by the experts. The number of training tables $(i \times j) \times 2$.

Results of Calculations

An example of expert reasoning can serve as the following rules assess the influence of geological factor on the construction time:

LS 1:	If the diameter is <2 and depth[3-8] and track length >600 and geometry of the route (number of turns) >3 and slope of the route (number of turns in the cut) [1-3] and shape sections III, IV $\Rightarrow V_{F_i T} \rightarrow$ average
LU 1:	If the fortress [3-6] and water saturation <0.1 and the density of underground structures [high], and the density of surface facilities [average] traffic load [high] and the environment [normal] view site [residential] and historical and cultural value [is] complex and the significance of the [required] and h_{GF_i} [low] $\Rightarrow Z_{F_i T} \rightarrow$ below average

Conclusion

Thus, each rule is developed on a set of formal parameters of the project, gives us an expert estimation of influence and degree of

influence of the uncertainty factor (F_i) on the integral indicator (K_j) for each possible combination of values for these parameters. The work was done by the grant of Russian scientific Foundation (project No. 17-11-01353).

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ENVIRONMENTAL IMPACTS OF THE OIL AND GAS
INDUSTRY IN NIGER DELTA REGION

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Abstract: Oil and gas exploration and exploitation in Niger Delta region (Nigeria) have been characterized by environmental degradation and deterioration as a result of oil spillage, flaring of gas, deforestation and other unwholesome practices of oil and gas multinational companies operating in the area. The devastation of the environment is the consequence of all stages of oil and gas activities from the exploration, drilling to transportation and storage. These environmentally unfriendly acts adversely affect the inhabitants whose livelihoods depend on the ecosystem for survival. This paper focuses on Niger Delta region, the country's hydrocarbon hub. The main goal of the study is to review the environmental, health and social implications resulting from oil spill, gas flaring and other exploration related activities. It also suggests ways to mitigate some of these impacts through government policies and regulations of the oil and gas industries operating in the region.

Keywords: Niger Delta Region, Oil and Gas Activities, Oil Spillage, Gas Flaring, Ecosystem, Environmental Protection.

Introduction

Oil and gas exploration and exploitation has been ongoing since 1956 when crude oil was discovered in Oloibiri, Niger Delta region of Nigeria. Even though proceeds from crude oil has immensely increased the revenue of Nigeria and made her the biggest economy in Africa, the consequences of unsustainable oil and gas activities in the region have been catastrophic to the environment.

Oil and Gas Economic Benefits to Nigeria

As of 2016, oil and gas exports generated more than 90% of export earnings and about 80% of federal government of Nigeria's revenue, as well as generating more than 10% of its GDP [3]. It also accounts for more than 85% of foreign exchange earnings, and about 65% of

government budgetary revenues. Nigeria's proven crude oil reserves according to OPEC in 2016 is over 37 million barrels [7]. These proven reserves make Nigeria one of the most petroleum-rich countries in the world. Nigeria's crude oil production averages around 1,900,000 in barrels per day in 2012 and has dropped to about 1,500,000 barrels per day in 2016 [7].

Oil Spills

It is estimated that in the past five decades about 9 million-13 million (1.5 million tons) of oil has been spilled into the Niger Delta ecosystem [5]. In 2008 alone it was reported by Amnesty International that a total of over 100,000 barrels of crude oil was spilled in Bode, a community in Niger Delta region, even though Shell Petroleum Development Company (SPDC) put the figure at just 1600 barrels [2]. Again, Amnesty International argued that even though figures on the website of SPDC had shown that between 2007 and 2014, an estimated 1693 incidences of spill occurred and more than 350,000 barrels of crude oil spilled into the region, the actual volume of crude spilled was underestimated [2]. The majority of the spill incidences in the Niger Delta occur on land, swamp, farmland, etc. And cause severe hardship to the inhabitants [5].

Gas Flaring

Flaring of gas is another environmental challenge experienced in the area. Gas has been flared in Nigeria's Niger Delta since the beginning of exploitation and exploration of crude oil in the 1950s. It has been recorded that Nigeria flares about 40% natural gas while more than 10% is been re-injected to enhance the recovery of oil [6]. The estimated quantity of natural gas flared in Niger Delta is about 17.2 billion m³ per year, this volume is approximately equivalent to a quarter of the current power consumption need of the whole of Africa [1]. These ruinous practices by oil and gas companies operating in the region have diffused highly toxic gasses into the atmosphere in Niger Delta. The concentration of these toxicants have caused acid rain, which has resulted to loss of soil fertility, destruction of vegetation and

devastation of buildings by corrugation of roofs. While numerous respiratory and reproductive health challenges have also been reported. [8].

Conclusion

Apart from the direct negative health, social and environmental effects in the Niger Delta region from oil and gas activities, there are far-reaching impacts on livelihoods in local communities that largely depend on natural resources from agriculture, fisheries and other ecosystem services for survival. There is a serious lack of manpower and equipment, to effectively monitor and respond to oil spill, gas flaring and other environmental hazards prevalent in the area. Since the government seem to lack adequate information about the extent of the devastation, it reduces its ability to combat the menace of environmental degradation and the resultant consequences on the inhabitants and the ecosystem.

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**RELATIONSHIP ANALYSIS OF THE ENVIRONMENTAL
DETERIORATION AND URBANIZATION PROCESSES IN
MAJOR CITIES**

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Abstract: The paper discusses the impact of urbanization processes in big cities. The article describes the direct relationship between the deterioration of environment in major cities and typical urbanization processes. The factors, which impair the environment in urban areas, are also given.

Key words: urbanization, environmental deterioration, developing countries, urban areas, major cities.

Modern urbanization is accompanied by the deterioration of urban environment, especially in developing countries. Urbanization processes are threatening the health of population, become an obstacle to overcome economic backwardness. Among the consequences of multiple crises are such aspects as population explosion, hunger and malnutrition of significant parts of the population, causing deterioration in the quality of human potential. Devastating ecological imbalance in big cities all over the world is happening right now.

The relationship of urbanization processes and the environment became real due to several factors in a complex of socio-economic development and interaction between society and nature. Understanding of general and specific features of the environment in major cities is important for a long-term strategy for international cooperation in the field of global issues of population and the environment development.

During a long time, “urbanization” meant, above all, the growth in urban population and values of cities. Still relatively new in developing countries, urbanization is often interpreted as the growth, development and reconstruction of certain parts of cities. Modern interpretation of urbanization cannot ignore the natural and environmental situation. Urbanization creates a relatively limited area or a specific space with especially intense interaction between population, society, economy and nature. Cities and their natural environment form a certain unity.

Among the factors that determine the quality of environment in cities of developing countries, some have to be noted aside: disordered and uncontrolled urbanization in terms of economic weak development; urban explosion, which is expressed primarily in leading the growth of the largest centers; the lack of the necessary financial and technical resources; insufficient level of General education; low level of policy in urban development; the limitations of environmental legislation. Cities are also adversely influenced by circumstances such as chaotic urban development, the enormous density of the population in central and peripheral parts of cities, the limitations of comprehensive urban planning and legal regulation (which is inherent in most developing countries). Unfortunately, the immediate neighborhood of densely populated residential areas and industrial enterprises with outdated technology and without treatment facilities are also very often. This further worsens the condition of the environment in cities. The state of the environment in cities presents a challenge to their sustainable development.

By the end of the first quarter of the XXI century, the annual growth of the urban population in developing countries, according to one of the UN forecasts, will amount to approximately 90 million people. This leads to the absorption of agricultural lands by the cities. But in most developing countries, where the urban population is

engaged in agriculture, this fact is especially painful manifested a growing shortage of farmland. This urban sprawl also degrades the ecological condition of urbanized areas.

There are important geographical factors affecting the state of the environment in cities of developing countries either. Among these factors can be named: the atmosphere's ability to dilute incoming pollutants depending on the meteorological conditions at various latitudes. In the tropics, where most of developing countries are located, the ability of the atmosphere to the perception and the dilution of incoming contaminants is about 3 times lower than in mid-latitudes of Western Europe. Research conducted in several developing countries, showed the presence of dangerous concentrations of pollutants in the atmosphere of the largest cities. These data are usually high in urban areas and often has dangerous degree of air pollution, to a certain extent, due to the considerable concentration of industry.

The deterioration of the quality of the air in large cities in is associated with faster relative to the growth of population and industries, the pace of production and consumption of energy. The basis for the development of the electricity sector in developing countries was the construction of thermal power plants, typically without costly devices for the protection of the environment.

Considering all these facts, the world is becoming urbanized and not coincidentally one of the goals of sustainable development until 2030 is devoted to towns and cities. They must:

- stay productive: people should be able to find a decent job, businesses can effectively produce and trade, this requires a successful infrastructure, and therefore need a network of roads, public transport, energy, water and sanitation, waste management system, an effective judicial system to enforce contracts;
- ensure social integration: the city should not be a place that increases the gap between rich and poor. Effective urban planning and policy should build cities where people of different races, classes and ethnic groups interact productively, peacefully and with a high degree of social mobility and trust.
- be environmentally sustainable: because of the high population density of the city vulnerable to environmental

diseases. Therefore, the city should conduct two kinds of environmental protection: to reduce the "ecological footprint", and to provide stability to changing environmental conditions.

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Filippova D.V.
**ECOLOGICAL AND ECONOMIC ASSESSMENT OF THE
IMPACT OF CIVIL AVIATION FACILITIES ON THE
ATMOSPHERE: CASE STUDY OF SHEREMETYEVO
INTERNATIONAL AIRPORT**

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Abstract: Every year civil aviation becomes popular as a basic type of transport. It is one of the most important links of international relationships, because of it the environmental problems are not local, but global. Thus, the solution of these problems calls to unite all countries.

Key words: civil aviation facilities, contaminations, greenhouse gas emissions, pollutant, fuel combustion.

The relevance of this work lies in the fact that civil aviation is one of the most important links of international relationship, because of it the impact on the environment is not local, but global.

The object of my research is Sheremetyevo International Airport.

The subject of research is the civil aviation impact on the environment.

The goal of the work is to analyze the impact of civil aviation facilities on the atmosphere by the example of Sheremetyevo International Airport.

Tasks:

- to identify the pollution sources of civil aviation;
- to analyze the impact of aviation and airports on the atmosphere;
- to assess the environmental impact of airport operations by the example of Sheremetyevo International Airport;
- to analyze programs to reduce harmful emissions of the enterprise;
- to develop alternative proposals for the implementation of effective methods to reduce the negative impacts of civil aviation facilities on the atmosphere.

The peculiarity of emissions from air transport - is the height. Consequently, the atmospheric composition changes in various forms, both directly and indirectly.

According to recent data, in 2015 the volume of greenhouse gas emissions in the country amounted to 2.361132 billion tons of CO₂-eq. excluding land use and forestry [1].

In 2015, the total volume of CO₂, CH₄ and N₂O emissions from fuel combustion by civil aviation was 9.98 million tons CO₂-eq., which is 50% lower than in 1990.

Sheremetyevo International Airport has 761 sources of air pollution: 263 controlled and 498 uncontrolled sources of contamination.

According to the specialists, the largest number of combustion products is emitted in to the atmosphere during landing, taking-off and engine preheating.

The speed of spreading and the concentration of harmful substances of the combustion products in the air depend primarily on weather conditions [2].

By evaluating the total amount of the main air pollutants in the airport control airside, as a result of its activity, it was revealed that on the area of 4 sq.km from 1 up to 1.5 tons of carbon monoxide, 300-500 kg hydrocarbon compounds and 50-80 kg nitrogen oxides are emitted. And this does not include emissions from special vehicles on the airport area. This amount of pollutants together with a combination of adverse weather conditions may lead to increased concentrations of these substances [3].

The composition of the atmosphere emissions includes more than 55 different substances.

For each type of aircraft engine calculations were made for such substances as hydrocarbons (12 tons), carbon monoxide (80 tons), nitrogen oxides (II, IV) (907 and 147 tons), sulfur oxide (II) (498 tons) and soot (2,6 tons).

Sheremetyevo International airport annually increases funding for activities in the field of environmental protection.

According to the Russian Government resolution of 22.04.2015, starting from the 1st of January 2017, the obligation to submit annual reports on greenhouse gas emissions will be assigned to all organizations with more than 50 thousand tons of CO₂-eq. greenhouse

gas emissions per year, as well as to all organizations engaged in aviation, railway, sea and river transport, in order to reduce greenhouse gas emissions by 2020 to a level of less than 75% of the volume in 1990 [4].

According to these instructions CO₂ emissions were calculated for the airports' aircrafts for domestic flights in 2017. The emissions were calculated for all types of aircrafts of the Sheremetyevo fleet during operations such as taking-off, climbing, landing and small gas. Thus, we can see that in 2017 from aircraft exploitation 59,107.47 tons of CO₂ were emitted into the atmosphere, accounting for 0,59% of the annual volume of Russian civil aviation greenhouse gas emissions.

By 2015 in the field of air protection such measures as the decommissioning of obsolete vehicles with engines have been implemented. Vehicles with higher environmental class (Euro 4.5) were purchased and put into operation instead of them.

Furthermore, there are regular checks on the toxicity of cars. Also works on modernization of the boiler houses are being done.

It is planned to build the third runway by 2018. This runway will reduce the flux density, which will reduce the aircrafts noise [5].

My alternative proposals are:

1. Planting of greenery of stunted tree species only in the zone with controlled sources of pollution in the airport area;
2. Engine improving or switching on the diesel engine type;
3. A gradual transition to the aviation gasoline or kerosene to methane and hydrogen fuel;
4. Reducing aircraft waiting time for landing operations;
5. Add carbon dioxide emissions to the register of significant environmental aspect of the airport activity.

As a result of this work, civil aviation sources of pollution were identified, substances and their quantitative indicators by the example of Sheremetyevo International Airport were determined and measures to reduce greenhouse gas emissions into the atmosphere by the enterprise were proposed.

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THE DEVELOPMENT AND USE OF ENVIRONMENTALLY FRIENDLY SOURCES OF ENERGY (EXAMPLE OF SOLAR THERMAL INSTALLATION IN THE REPUBLIC OF DAGESTAN)

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Abstract: The article analyzes the ecological - economic development of the renewable energy sources and identified factors impeding the expansion of the scale. Prospects and directions of development of renewable energy sources and their role in the Republic of Dagestan energy future.

Key words: Power management, the use of renewable energy, sustainability, efficiency, energy conservation, ecosystem changes.

The rationale of the research lies in the fact that the opportunity of using pollution-free and available renewable insolation energy draws increasing attention.

Solar-drive heat setups can be used for the purposes of heating and hot water supply for every housing, agricultural and industrial facilities and buildings located in comfortable climatic conditions, that is, in districts with a relatively great number of sunny days during the year. Solar setups already come into wide commercial use globally. They are being used for water heating in swimming pools, water supply of individual and communal consumers, heating of buildings, and drying of agricultural products.

The purpose of the work: Research of experimental solar-drive setup with polycarbonate collectors in natural climatic and operating conditions in the Republic of Dagestan on the “Solntse” polygon of the Federal United Institute of High Temperatures of the Russian Academy of Sciences.[1-2]

The objectives of the work:

- to analyze and systematize the current usage status of the renewable energy sources in Russia and in the Republic of Dagestan;
- to conduct research on the experimental solar-drive setup with polycarbonate collectors in climatic and operating conditions;
- to develop the assessment methodology for the solar energy potential and research the experimental solar-drive setup;
- to consider major factors of ecological impact of renewable energy sources on different environments and natural objects.

Solar energy sources can be referred to as RES: the solar radiation energy, the energy of rivers, wind, biomass, and the ocean.

The non-solar RES are: the geothermal energy, the tidal energy, the low-grade heat sources combined with thermal pumps.

Reserves of renewable energy sources in the Republic of Dagestan

- the Republic of Dagestan has large reserves of geothermal energy sources. The prospective reserves of the drilled part of Dagestan amount up to 8 mln m³/day. There are over 30 fields, 10 of which are drilled with the prospective reserves of 250 thousand m³/day and the operational stock of 120 thousand m³/day.
- the sun shine duration ranges from 214 days in flat to 315 days in mountainous areas;
- the sun shine radiation flux on a clear day accounts for 1 kW/m²;
- the wind resources are in the order of 60 bln kW/h per year;

- among bioenergetics resources the animal breeding organic wastes are of interest (chart 1)

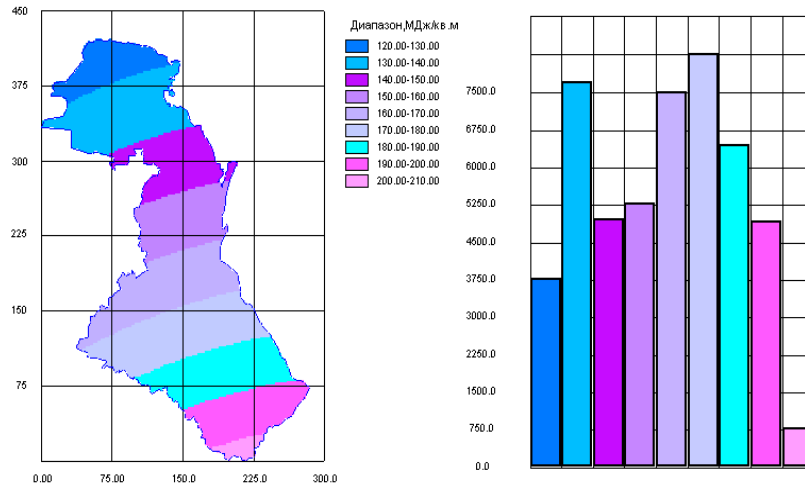
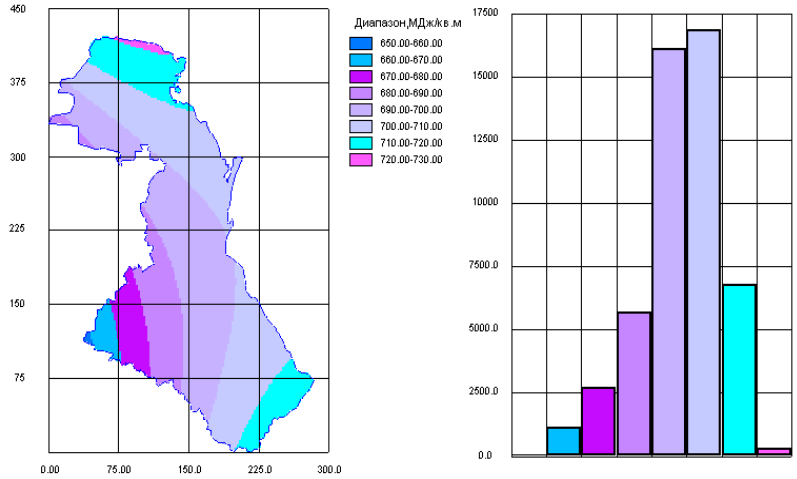


chart 1. The sunshine radiation density cadaster (a) and the histogram (b). January



The sunshine radiation density cadaster (a) and the histogram (b). June



Table 1. Austrian experimental house and its characteristics
total structural volume - 500m^3 .

-total area - 130m^2

-living area - 80m^2

-estimated number of residents - 6 people,

-estimated (maximum) hourly heating load - 10 kW,

-estimated hot water supply load - 2 kW

-estimated load on the electrical power supply system - 3 kW.

The total estimated required power of the house is 15 kW.(table 1)

The tasks of research on the solar system with an experimental lot of solar polycarbonate collectors are:

- hydraulic tests of the experimental solar setup with polycarbonate collectors;

- experimental definition of overall heat loss coefficient by the efficiency coefficient of the absorptive collector panel;

- heat loss coefficient of the receiver;

- thermal capacity of the receiver;

- experimental definition of daily, monthly and yearly useful power of the solar setup with different temperature and actinometrical operating conditions;

- the study of impact of dust on transparent surface on its transmittance relative to solar insulation.[3-4]

Conclusions:

- the calculations of thermal characteristics of the single-floor residential house with the total structural volume of 500 cubic meters, total area of 130 square meters and living area of 80 square meters were made. The number of residents is 6 people;
- the yearly graph of thermal charge of the house of hot water supply and central heating in the climatic conditions of Makhachkala was made. The maximum house heating load (in January) is 10 kW, the hot water load is 2,0 kW;
- the principal scheme of electric supply of the house was developed (central heating, hot water supply and electrical supply);
- the potential energetic resources and their impact on the environment were presented;
- the major factors of ecological impact of renewable energy sources on different environments and objects were considered;
- the first-order organizational problems were determined, the solution of which will allow expanding the use areas and increasing the use volumes of the solar energy in the Republic of Dagestan.

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**DEVELOPMENT OF ECOTOURISM IN CAVE-TOWNS
CHUFUT-KALE AND MANGUP-KALE**

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Abstract: This article considers the possibility of ecotourism development in two cave-towns in the Crimea: Chufut-Kale and Mangup-Kale. It gives a detailed analysis of the history and the ecological situation there and suggestions for organizing ecological tourism in these cave-towns.

Key words: ecotourism, development, cave-towns Chufut-Kale and Mangup-Kale, the Crimea.

Introduction. For the first time the concept of "ecotourism" appeared at the end of the last century. Today it is one of the most popular types of recreation. In Russia on the Crimean Peninsula, ecotourism is very popular and is part of eco-education of tourists. Chufut-Kale and Mangup-Kale, the cave cities located on the territory of Bakhchisaray District, are objects of cultural heritage of Federal importance. [1]

The aim of this study is to justify the possibility of ecotourism development in the above two cave cities.

Main part. Chufut-Kale and Mangup-Kale are situated at a distance of 20 km from each other on the territory of Bakhchisaray District. Both cities were visited by us in the course of production practice held in the Crimea natural reserve. We have studied the history of these towns, described their current state and the recreational opportunities. On this basis, some proposals for the inclusion of cave cities in the routes of ecological tourism have been formulated.

These town-fortresses (an analogue of medieval European castles) were built by local residents in V–VI centuries, when there was a threat of invasion of nomads. The towns served to protect and shelter the population from these attacks. The Byzantine Empire took part in the construction of the cave-towns as Tavrika was included in the sphere of its interests (1, c 27).

Chufut-Kale is the best preserved of all cave-towns in the Crimea. The exact date of its foundation is still unknown. The approximate period of its construction is VIII-X century. The town is located on a small plateau surrounded by sheer two hundred foot cliffs from its three sides, and on the East side of the plateau it is connected to the mountain Beshik-Tau by a saddle.

Usually people get into the city by a partially preserved stone road that leads to hidden southern gates. The gates are hidden in the rock, so they can only be seen on coming closely to them. In the town there are some ruins of the houses and the wall that once surrounded the town. (Fig.1)

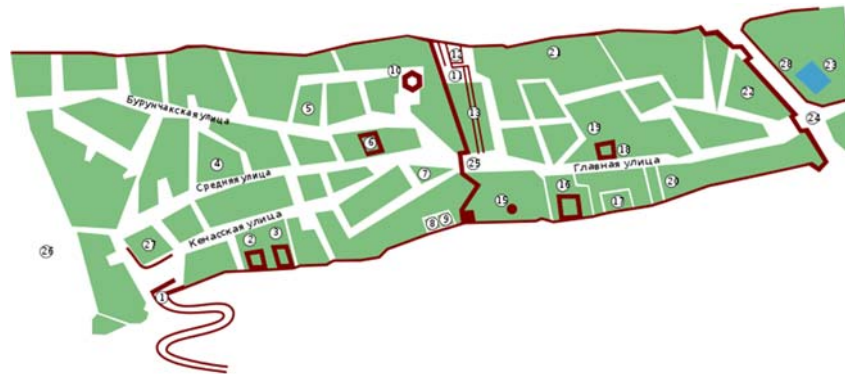


Fig.1 Map-scheme of the cave city of Chufut-Kale

Chufut-Kale is under the state protection. One can only enter the town the city after purchasing a ticket at a certain time of the day. The object can be viewed both independently and with a guide. You can also buy a brochure with a map and various books on the history of the Crimea Peninsula. There are information boards with a brief description of the place. Many tourists are also attracted by the incredible views from the plateau.

Mangup is located on the top of a plateau rising 584 m above the sea level. On the plateau, traces of a human Parking of the Neolithic period have been found. In the III-IV centuries there lived Scythian-Sarmatians on the plateau. The greatest rise of the town was XIV-XV centuries – when it got the status of the capital of the Theodoro

Principality, founded by immigrants from Byzantium. For the town, that period was the time of prosperity and wealth of the town, it expanded, acquired new defensive fortifications and great buildings such as the prince's palace and the basilica [2, 39].

Unfortunately, Mangup-Kale has survived much worse than Chufut-Kale. But most tourists are attracted by a beautiful view that opens from a height of about 600 m above the sea level.

Unfortunately, there is no organized tourism there. As a result, visitors often leave trash, put up tents in places not suitable for camping, and make fires. [3]

Based on our observations, we propose including these cave-towns in the routes of ecological tourism. In this connection we can recommend the following:

1) As these historical monuments are located away from highways, the routes can be arranged in several ways. This can be a hiking, a horse riding or a cycling route. The latter two options are attractive in terms of ecotourism.

2) Information stands and literature must be available for tourists, to help them get integrated into the landscapes. Undoubtedly, cave-towns are an example of a harmonious combination of natural environment and architecture.

3) It is necessary to define and identify the sites with the most scenic views, which is an important part of ecotourism. These places can accommodate information stands with the description of landscapes (relief, vegetation, etc.).

4) It is possible to organize camping sites in the vicinity. This, of course, will be costly, but will make the area more attractive for tourists.

Conclusion. It should be noted that the cave-towns of Chufut Kale and Mangup Kale have a good potential to become objects of ecological tourism and be included in specialized tourist routes. This will require some effort and costs. But it is bound to pay off as it will attract more tourists and contribute to the formation of ecological consciousness.

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THE RESULTS OF MONITORING VOLUME ACTIVITY OF RADON IN CHILDREN'S INSTITUTIONS IN LERMONTOV

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Abstract: In this work, the results of monitoring by the integrated method of radon content in the premises of children's institutions in the city of Lermontov are presented.

Key words: specific activity, dose rate of gamma radiation, internal irradiation, natural sources of ionizing radiation, annual average volumetric activity of radon, radiation dose.

Introduction. It is known that the largest contribution to the total radiation dose of the population is made by natural radiation sources, the main one is radon and the products of its decay.

The level of radon in the premises of residential, public and industrial buildings and structures varies widely, and can reach large values [1].

Such fluctuations are due to a number of factors: the location of the building, the features of its construction and ventilation, the type of building materials used in the construction. Radon is released from the ground under buildings, from building materials, from which the building envelopes are made (walls, ceiling, floor), and accumulates indoors [2-4].

The content of radon is estimated by the equivalent of the equilibrium volume activity of radon (EVA_{Rn}), the hygienic standard of which is $200 \text{ Bq} / \text{m}^3$.

Radon is a heavier chemical element than air components, that's why it is accumulated in the lower part of the premises near the floor, consequently the critical group of the population is children.

The results of the survey of preschool and school educational institutions in some regions of the Russian Federation showed that there are institutions with EVA_{Rn} which exceed the hygienic standard by 2 or more times [5]. Therefore, monitoring the radon content in children's institutions is an important and urgent task.

The purpose of this work is to monitor the radon content by an integral method in the premises of children's institutions in the city of Lermontov.

The city of Lermontov, Stavropol Territory, refers to settlements with increased radon hazard [2]. It is located in close proximity to one of the objects of the former uranium production of LPO Almaz.

Methodology. The objects of research are the premises of children's institutions in the city of Lermontov. All buildings are made of brick, with central heating, with natural ventilation.

To determine the volumetric activity of radon (VA_{Rn}), the integral method for measuring the volumetric activity of radon using the TREK-REI-1M equipment was used as the main method.

Measurement of volumetric activity of radon was carried out with the help of exmeters, using which a passive sampling of air is taken to the sampling chamber with a dielectric track detector inside it. For the environmental and hygienic evaluation of the results obtained, the permissible exposure doses for radiation sources were used in NRB-99/2009. [7]

Results and conclusion

In this paper, a measurement of VA_{Rn} was carried out in the premises of 7 children's institutions in the city of Lermontov.

After the exposure, the detectors were processed, the values of EVA_{Rn} were calculated, and the EVA_{Rn} data obtained was systematized and statistical processing was performed.

Then the analysis of the obtained data was carried out. The analysis showed that all the buildings surveyed were built of brick, with

central heating and natural ventilation, built in different years, beginning from 1956.

First of all, we checked how the content of radon depends on seasonal variations in this territory. For this purpose, the data was divided into two periods-heating and warm ones. The obtained results showed that in the heating period EVA_{Rn} is somewhat higher than in the warm period, the data is presented in Table 1.

Table 1 - Values of EVA_{Rn} in the premises of children's institutions in the city of Lermontov in the heating and warm period, n = 488 premises

Period	Max value of EVA_{Rn} , Bq/m ³	Average value of EVA_{Rn} , Bq/m ³
heating	1226	148
warm	1347	132

Although the average values in the heating period exceed the values in the warm period, the maximum value of EVA_{Rn} was higher in the warm period.

The average values for both periods do not exceed the normative index (200Bq / m³), however both in the heating and in the warm period the maximum values exceed the normative index. Therefore, it is necessary to identify premises with maximum values and to establish, and, if necessary, eliminate the causes of these excesses.

For the hygienic assessment of premises, the average annual dose of internal irradiation from radon was calculated. It was 9 mSv / year. According to OSPORB 99-2010, if the values of effective radiation doses from all major natural radiation sources are higher than 5 to 10 mSv / year - population exposure is increased [6].

The main measure of population protection is the control of these values in the premises. There is a need to carry out measures to reduce radon in the premises.

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**ASSESSMENT OF THE ECOLOGICAL STATUS
OF THE REGION OF CAUCASIAN MINERAL WATERS**

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Abstract: This work is devoted to the analysis of the ecological situation in the Caucasian Spas resort region. The article analyzed the main environmental problems, described the current state of the hydromineral base, and proposed some measures to improve the ecological situation in the resort.

Key words: Caucasian Mineral Waters, environmental situation, hydro-mineral base.

Caucasian Mineral Waters is one of the oldest resort regions in Russia. Great fame was acquired due to therapeutic mineral waters of various composition (Narzan, Essentuk mineral waters, etc.) and Tambukansky Lake which is rich in therapeutic mud. The region is

located in the territory of three subjects of the Russian Federation (Stavropol Krai, Kabardino-Balkaria, Karachaevo-Cherkessia) within the boundaries of the mountain-sanitary protection district.[1] Pyatigorsk, Kislovodsk and Yessentuki are the largest cities located in this territory.

The main development of this territory has begun during the Soviet Union Period. During this period Caucasian Mineral Waters has become a popular health resort among USSR population. In 1990 about 1.5 million people from all over the country and abroad have visited this place for both recovery and vacation reasons.[2] There were about 1.4 million visitors in the Caucasian Mineral Waters in 2016 and, according to the forecasts, the number will increase. This situation increases the anthropogenic pressure on ecological state of the region.[3]

Over the past 20 years the rapid economic development of the region has led to a significant increase in the population and urbanization of this territory, which continues today. Parallelly, there was an excessive development of industry in cities of the region, which was not related to health-improving (sanatorium-resort) purposes, and due to this fact agriculture industry has begun to use pesticides, synthetic fertilizers in its practice. A high anthropogenic pressure has caused environmental problems.

All these factors are real threats to hydromineralic resources of the resort territory. Today we can see exacerbation of environmental problems and irrational use of the unique natural resources of this territory.

It is worth noticing that inexact legislation has made a big contribution to this problem by determining the status of the region, its division into sanitary zones and also the lack of due checks of the territory by agencies who are responsible for this health resort.[3]

At the moment, the following environmental problems are identified in this region:

1. Illegal development of nature conservancy zones.
2. Abandoned and obsolescent interstices for extraction of mineral water.
3. Illegal extraction of minerals.
4. Excessive agro-industrial activity.

5. Emissions and discharges of repugnant substances from stationary pollution sources.
6. Nuclear pollution.
7. Evolution and recycling of domestic and industrial waste.

The most significant environmental problems from the above are the formation and utilization of domestic and industrial waste and irrational mining of mineral waters.

First of all such problems as incorrect recycling processing of domestic and industrial waste and impractical extraction of mineral water should be solved as long as they contribute to negative effects on the region most of all.

The problem of illegal development is growing every year, since the construction of various resort facilities, mining enterprises in this area is economically profitable. The income from such facilities is many times higher than the penalty for illegal construction, and at the moment there is the possibility to file false information that is not properly checked, in order to put the plot into economic circulation.

In the territory of the Caucasian Mineral Waters region, more than 350 wells of various purposes were drilled in the area of more than five thousand square kilometers at different times, of which more than 30 types of mineral water have been extracted. [2] At the moment, there is no clear supervision and accounting of wells, which affects the region's hydromineral base.

The onsequence is disappointing. For example, sources as Essentuki-20 (only this water could be drunk without restrictions, since it has a relatively low content of mineral elements) and Ponomarevsky in the medical park of Essentuki have already been attributed to the disappeared.

The number of vehicles in the region is growing rapidly, and the transport system is only developed between major cities, which leads to significant air pollution. The largest amount of emissions of harmful substances into the atmosphere, which negatively affects the natural state of the environment of the resorts of the Caucasian Mineral Waters, is provided by the transport complex represented by road, rail and air transport.

Also in the region there is a problem of waste management, there are a lot of illegal, not licensed landfills and landfills, which are revealed during inspections.

In Pyatigorsk there is PTEK (Pyatigorsk Heat and Power Complex), which was built in 1987 and is the only one in the region, but now the complex needs a capital upgrade and full load. At PTEK, only a meager portion of the MSW of the Mineral Waters of the Caucasus enters, in addition to Pyatigorsk's wastes, some of Lermontov's and Yessentuk's wastes are processed there. All other wastes are digested in landfills or landfills.

In the cities of Mineral Waters and Georgievsk, there are no ways of recycling waste, and as a result, they accumulate, which is unacceptable for the territory that has the status of a specially protected facility.

For the resort region, in the depths of which mineral springs are formed, such a policy can ultimately lead to an ecological catastrophe.

In order to improve the state of the environment, it is necessary to strive for an integrated approach to waste processing, the creation of an effective system of public administration in the area of resort nature management, encouraging the withdrawal of enterprises outside the given territory, strengthening control over wells and their licensing, and most importantly, an operational system for collecting and receiving information on the state of the ecological situation in the region of the Caucasian Mineral Waters. If no measures are taken, the ecological situation and the hydromineral complex of the unique resort of the Caucasian Mineral Waters will be irreparably damaged.

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**THE CALCULATION OF THE BASIC PARAMETERS AND
THE ECONOMIC EFFICIENCY OF A BELT CONVEYOR FOR
MIKHAILOVSKY GOK**

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Abstract: The article considers the possibility of installation of a belt conveyor in the Mikhailovsky GOK from the crusher to the loading place, which is now used trucking. Economic efficiency of the event is calculated, as well as the positive aspects of changing the car transport conveyor one. In addition, this solution will help to improve the environment for the mining company.

Key words: Belt conveyor, the basic parameters of the conveyor, the economic efficiency of the installation of the conveyor at the quarry, the preservation of the environment of the enterprise territory.

Introduction. Mikhailovsky GOK is one of the largest in Russia and the CIS enterprises for extraction and enrichment of iron ore.

Raw materials base of mining and processing plant Mikhailovsky is Mikhaylovskoye Deposit of KMA - the largest in Russia on stocks of iron ore. The ore here lies a powerful layer in a width of up to 2.5 km and a length of about 7 km away. the Modern parameters of the GOK:

- length – approximately 6000 m.;
- depth is more than 380 m.;
- width – about 4000 m.;
- the maximum possible deepening of career "- 400 m". [1]

The paper discusses the replacement of trucks with payload capacity of 110 tons, to transport iron ore from Mikhailovsky GOK from crusher to loading a belt conveyor with a length of 3 km.

The conveyor transport is one of the most environmentally friendly and affordable means of transport. In the current environmental situation of the mining companies are forced to seek solutions to the question of a significant reduction in adverse environmental impact. Environment during the field development and the transportation of

cargo conveyor transport reduces the ingress of fumes into the air. In addition, every year fossil fuels become more expensive, and conveyors are powered by electric drive.

Methodology. According to foreign sources the use of conveyor transport provides a significant reduction in the cost of energy (65-70%) and an even more impressive increase in labour productivity (labour costs decreased by 80-93%). [2]

The main parameters of the conveyor are calculated according to the following formulas:

Source data: performance $V_3=820 \text{ m}^3/\text{h}$; density bulk cargo $\gamma_p=2,04 \text{ t/m}^3$, the maximum size of the piece $\alpha_{\max}=150 \text{ mm}$, angle of repose in motion $\varphi_p=15^\circ$.

1 The estimated hourly capacity of the conveyor:

$$Q=Q_3 \cdot k_i=820 \cdot 1.25=1025, \text{ m}^3/\text{h},$$

k_i – the utilization factor of the conveyor ($k_i=1,0 \div 1,5$), V_3 – the given productivity.

2. Tape width:

Taking cargo for branches of the tape three roller support with inclination of side rollers is 30° belt speed $v=2.5 \text{ m/s}$, determine the width of the tape:

$$B = 1.1 \cdot \left(\sqrt{\frac{Q}{v \cdot k_p \cdot \gamma_p \cdot k_\beta}} + 0.05 \right) = 1.03 \text{ m},$$

Q - the conveying capacity, t/h; γ_p - bulk cargo density, in t/m^3 ; k_p - coefficient of performance depending on the type carrying roller, the angle of inclination of the side rollers of β , the angle of repose of cargo in motion φ ; k_β – coefficient taking into account the angle of inclination of the conveyor.

The resulting width of the tape we check the size of the transported pieces.

$$B_{\min}=2\alpha_{\max}+0,2=2 \cdot 0,15+0,2=0,5 \text{ m}$$

Great value is rounded to the nearest large values of the standard series taken $B=1000\text{mm}$.

3. Linear load of the transported goods

$$q_r = V \cdot \gamma / 3,6 \cdot v = 232,33 \text{ kg/m}$$

Running load of the tape until the selected type can be determined by the formula

$$q_l \approx (15 \div 35) \cdot B = 25 \text{ kg/m}$$

The benefits of using a belt conveyor: low power consumption, simple design, easy operation, high reliability, high performance, environmentally friendly.

Disadvantages of operation of a belt conveyor: the high cost of the belt, the high cost of roller supports. [3]

Results of Calculations

The main economic cost of transport is calculated according to the formula:

$$R = \sum R_i,$$

where the belt conveyor:

R_1 – the cost of energy supply pipeline;

R_2 – the cost of labor service personnel;

R_3 – the cost of lubricants;

R_4 – the cost of repair of the tape.

For automobile transport :

R_1 – the cost of fuel;

R_2 – costs of salaries to service personnel:

R_3 – repair costs and depreciation.

After the calculations the economic costs were as follows: Cost of transporting 1 ton of cargo with a maximum size of pieces of the cargo of 150 mm at a distance of 3000 m:

- Conveyor transport – 3.5 rubles;
- Automobile transport – 10 rubles.

In addition, the installation of the belt conveyor will solve the problem of environmental conditions at the quarry and surrounding areas.

The results of calculation of a carbon footprint received during modeling were used in the comparative schedule. [4]

Results and conclusion

The performed calculations showed the economic efficiency of the belt conveyor in the enterprise. For a short period of time installation and purchase of the belt conveyor will pay off. At the same time, the environmental situation of the area significantly improves (near enterprise, there are houses). There are analogues of the proposed idea in other enterprises, for example, the longest to date, single-span (odnoshovnyye) cable-belt conveyors with a length of respectively 30 km and 20 km, which are operated since 1984 in the territory of "Worsley Alumina Pty Ltd" (Western Australia), besides, the world's longest curved conveyor with a length of 18 km, which is in operation since 1987 at the enterprise, developing the area of the Dead sea potash ore Deposit (Sodom, Israel). [5]

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Kozlova E.V.
**THE ARID REGIONS OF RUSSIA AND THEIR CARBON SOIL
DYNAMICS**

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Abstract: The steppe biome of arid regions has a unique ability to form in watershed conditions soils that are exceptionally rich in organic matter, which characterize high potential and play a significant role in the global carbon depot. The absorption of carbon dioxide emission from burning of organic fuels, deforestation and soil erosion is calculated on the basis of the three-dimensional mathematical model of global carbon dioxide cycle in arid regions of Russia. The regional consequences revealed the largest loss of productive capacity in the Astrakhan region, as well as anthropogenic damage and natural decomposition of humus of the soils of this region by year 2060.

Key words: mathematical modeling, global biogeochemical cycle of carbon dioxide, anthropogenic impacts, arid ecosystems, net primary production, regional consequences.

Introduction. The total reserve of soil carbon in Russian steppe ecosystems is about 130 million tons for both ecosystems in the natural state and in anthropogenically disturbed ecosystems, but only natural ones are able to sustain carbon and continue to accumulate it. The total area of ecosystems in a natural state is about 500 thousand km², the total carbon stock of steppe ecosystems can be estimated at 35 billion tons, and the total potential of carbon sink with a long-term fixation of 75 million tons per year [1]. A specific quality of carbon deposition in heathland is its long shelf life and high reliability of binding, since the possibility of emission in undisturbed ecosystems is minimal, and a significant emission is observed only in case of anthropogenic disturbances. The ecological condition of the arid territories of Russia is one of the important problems that require constant monitoring. The establishment of an environmentally sustainable structure of arid agricultural landscapes is currently a priority issue in addressing drought mitigation, soil erosion, optimizing agricultural productivity and improving the environment.

Methodology. The purpose of this work is determination of the role of biosphere in compensation of CO₂ anthropogenic emissions into

atmosphere. The main attention is paid to the analysis of terrestrial ecosystems role in global stabilization of CO₂ quantity in the atmosphere. The calculations of biosphere dynamics processes taking into account the economic activity were conducted with the help of the three-dimensional mathematic model of global cycle of carbon in the atmosphere – terrestrial ecosystems – ocean system [2]. It is supposed that vegetation of each terrestrial sell belongs to one ecosystem type according to the world classification [3]. Each sell is characterized by the following variables: carbon of phytomass, carbon in the dead organic matter of the soil (humus and litter). One more variable is total quantity of carbon in the atmosphere in CO₂ form. There is a carbon exchange in CO₂ form with atmosphere and total carbon of every sell. The model describes the vegetation growth and humus accumulation and decomposition processes. The climate in each sell is characterized by average annual surface temperature and annual precipitation. The temperature and precipitation indices for each sell depending on the CO₂ quantity in atmosphere (greenhouse effect) are calculated with the aid of the three-dimensional climatic model of general circulation of atmosphere and ocean (GCM). The model was supplemented with the model of carbon cycle in the atmosphere – ocean system . It is supposed that prior to beginning of anthropogenic impacts there was absence of anthropogenic emissions of CO₂ into the atmosphere and the carbon quantity in the atmosphere – plants – soil – ocean system remained constant and the system was in the steady state.

The degradation of biological resources of arid and sub-humid territories in the southern regions has developed widely under the influence of anthropogenic factors. The following regions of the southern part of the Russian Federation are distinguished by a special aridity of the climate, accompanied by an increase in anthropogenic loads: the republics of Dagestan, Astrakhan, Volgograd and Samara regions.

Results of Calculations. The analysis of regional consequences of global climate change was performed for several regions: the Astrakhan region, the Volgograd region, Dagestan, Kazakhstan, Kalmykia, the Samara region, the Stavropol region.

The results of calculations from year 2000 till year 2060 are represented on the figure 1-2 [4]. The calculation of net primary

production of natural biota in percents in comparison with the value of year 2000 is represented in figure 1.

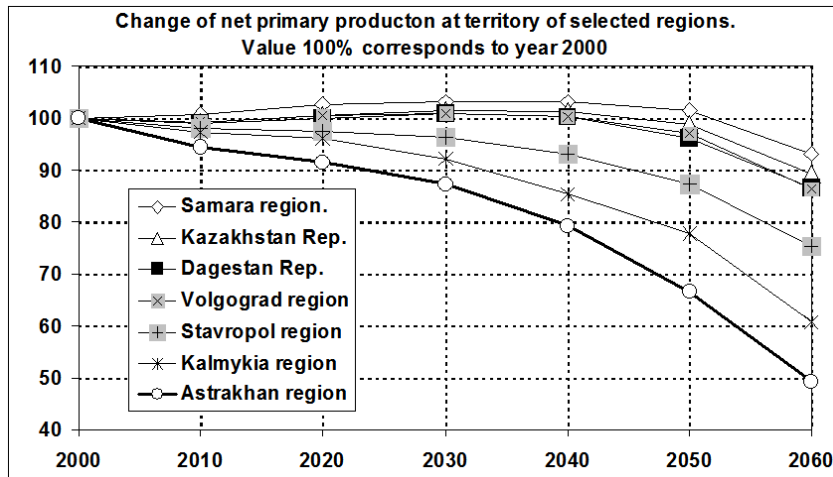


Figure 1. Change of carbon of net primary production (%) in the territory of the selected regions. Year 2000 was accepted as 100%.

Figure 2 represents the calculation of soil humus value in percent in comparison with the value in year 2000.

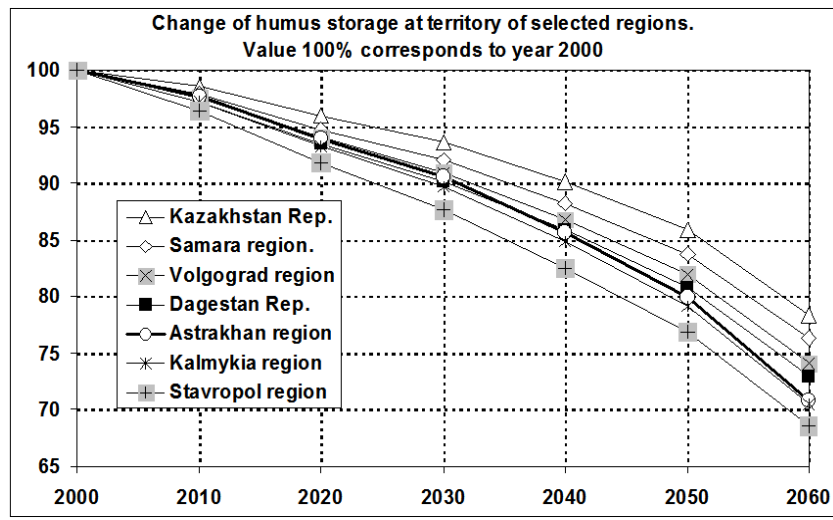


Figure 2. Change of humus carbon (%) in the territory of the selected regions. Year 2000 was accepted as 100%.

In conclusion. Analysis of regional calculation shows that Astrakhan region takes the special place among the other regions. The soils of Astrakhan region are characterized by low fertility, low humus content, the alkaline reaction of the soil solution, low absorption capacity, which is caused by soil formation under conditions of insufficient and unstable moistening, high temperatures, and the presence of salts. The soil erosion connected with the wrong incorrect land use was additionally considered. The loss of its productive capacity is the largest and consequently the worst in agricultural affectivity.

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Kuzmina A.V¹, Kuropyatnik K.N²
**EMERGENCY CONTROL MEASUREMENTS OF DIFFUSION
OF AIR POLLUTANT DURING THE PERIOD OF ADVERSE
WEATHER CONDITIONS**

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Abstract: in cities, where airquality monitoring happen to be, the forecast of diffusion of air pollutant during the period of adverse weather conditions is carried out. In its turn RosGidroMet is engaged in warning about the onset of adverse weather conditions.

Key words: atmosphere, adverse weather conditions, contaminant, pollutant, threshold limit value (TLV).

Moscow city and some residential place in its region (such as Bykovo, Vnukovo, Volokolamsk, Dmitrov, Domodedovo, Egorievsk, Kashira, Klin, Kolomna, Mozhaysk, Naro-Fominsk, Nemchinovka, Novo- Jerusalem, Pavlovsky Posad, Pavlovskoe, Serpukhov, Tretyakovo, Sheremetyevo) are included in the list of territories where airquality monitoring and forecast of adverse weather conditions are carried out. This is due to a big number of meteorological stations located in these areas that monitor the pollution of atmospheric air.

It is well known that during the periods, when the weather conditions contribute to the accumulation of harmful substances and contaminants in the lower atmosphere and the atmospheric scattering capacity reduce, the concentrations of air pollutants can increase dramatically. Sequential and short-term reduction of pollutant emissions is necessary in order to avoid a sharp pollutant concentrations' increase during such periods. Legal entities that have sources of aerial emissions of polluting substances into the atmospheric air, when obtaining forecasts of adverse meteorological conditions, are obliged to use reasonable efforts to reduce the emission of contaminants into the atmospheric air [1].

Warnings about the air polluting level increase due to expected adverse weather conditions are created in the forecast department of

Hydrometeorological center of Russia. Depending on the expected pollutant level three levels of warnings are distinguished. The first level of warnings takes place when an increase in the concentration of pollutants in the atmosphere is predicted to be 1.5 TLV, the second level - when an increase from 3 TLV to 5 TLV is predicted, the third level is more than 5 TLV.

Threshold limit value (TLV) is a sanitary and hygienic standard approved in the legislation. The threshold limit value is understood to be the concentration of chemical elements and their compounds in the environment, which, while the daily effect on the human body for a long time, does not cause pathological changes or diseases established by modern research methods at any time of life of the present and succeeding generations.

In accordance with each level of warning, the economic operator must switch to the appropriate operation mode. Arrangements for emission control during adverse weather conditions consist of three operating modes which ensure a gradually decrease of surface concentrations. The first operation mode is precautionary which does not require significant costs and does not lead to a decrease in production level. Its outstanding feature is the 15 % emission reduction. The second mode includes the measures of the first one and additional arrangements resulting in partial reduction of loads and not stopping production. In its turn emission reduction in addition to the first regime is taken equal to 20 % (35 % emission reduction all in all). The third mode, in addition to the first and second modes, involves reducing the production capacity until its completely suspension, reducing emissions in addition to the first and second modes is taken equal to 40 %.

The development of the atmosphere emission regulation measures is carried out directly at enterprises, organizations and institutions that are sources of atmospheric pollution, in design and industrial institutions in the light of specific features, according to each industry. Developing of such regulation measures are carried out for both operating and projected enterprises. While developing such things as the dispersion of pollutants in the atmosphere and its concentrations are playing an important role. During the adverse weather conditions it is necessary to achieve desired concentration reductions for each of the three modes with the least production efforts. The priority of the pollutant is also considered. Measures to reduce pollutant emissions

during the adverse weather conditions may be general, applicable in any enterprise, and specific, connected with certain industry [2].

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Kuzmina E. Yu¹, Khristoforova M. P., Kulieva G.A.³
**MEASUREMENT OF THE PARAMETERS OF THE
ELECTROMAGNETIC FIELD CREATED AROUND POWER
LINES (BY THE EXAMPLE OF POWER LINES IN THE
SOUTHERN ADMINISTRATIVE DISTRICT OF MOSCOW)**

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Abstract: The latest technologies are used to protect human rights and health. Such concerns are regularly expressed regarding the safety of cellular base stations, cellular phones, power lines, wireless computer networks and other sources of electromagnetic radiation.

Key words: power lines, maximum permissible level, electromagnetic radiation, electric field strength, magnetic flux density.

In recent years, an unprecedented growth in the number of various sources of electromagnetic fields has been observed in the Russian Federation [1]. According to the statistics of the Administration of Russian Federal Consumer Rights Protection and Human Health Control Service in Moscow, the number of citizens' appeals for reasons related to the use of sources of physical factors of

human exposure (noise, electromagnetic radiation) in 2015 increased by 25% compared with 2014 [2].

The main sources of electromagnetic radiation for the residents of Moscow are the base stations of cellular communications, cell phones, household electrical equipment, as well as power lines [3].

As part of the summer research and practice with students-masters, measurements were made of the parameters of the electromagnetic field near the eight-power transmission tower supports located in the Southern Administrative District of Moscow, Biryulevo Vostochnoe, along Vostryakovskiy proezd and Harkovskiy proezd (fig. 1). The measurements were taken at each of the selected points three times a day, seven days a week. In the morning hours: from 6.00 to 9.00. In the daytime: from 13.00 to 16.00. In the evening hours: from 18.00 to 21.00. The measurements were carried out at a distance of 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29 and 30 meters from each power line support.

13104 measurements were taken.



Figure 1. Points of measurement in the Southern Administrative District, Biryulevo Vostochnoe

Due to the measurements, it was established that the level of the electric field strength did not exceed the limit of the permissible value [4]. It should also be noted that the dynamics of changes in the levels of electromagnetic radiation with increasing distance from the power line support has been revealed.

The maximum values of the electric field strength are fixed at a distance of 5-10 m from the power line support. The measurements showed that there are fluctuations in the electric field strength depending on the day of the week, and during the day. The electric field strength increases in the evening and on weekends by an average of 40%. The maximum values of the magnetic flux density are fixed at a distance of 4-8 m from the power line supports [5]. An increase in magnetic flux density at weekends and in the evening hours by 60% was registered.

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**THE POSSIBILITY OF APPLYING THE NORWEGIAN
EXPERIENCE IN WIND ENERGY USE IN THE NORTH-
WESTERN FEDERAL DISTRICT OF RUSSIA**

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Abstract: The possibilities of using the Norwegian experience in the field of wind energy in the North-Western Federal district of Russia is a promising direction for urbanization ecology.

Key words: wind energy, green energy, urbanization ecology, environmental load, wind turbine, The North-Western Federal district of Russia.

Introduction. The ecological relevance of wind energy development in the North-Western Federal district of the Russian Federation cannot be doubted. The reduction of harmful emissions from power plants in cities and settlements with difficult ecological situation is an important task of urbanization of the environment. A widespread use of wind energy in the fuel and energy complex reduces the environmental burden in the region and thus increases the standard of living of the population.

Natural climatic conditions, a significant potential of offshore wind energy, shortage of raw energy are typical both for the North-Western Federal district of the Russian Federation and Norway and make it necessary to develop of wind energy. In Norway, wind energy is successfully developing, and every year occupies an increasingly

strong position in the fuel and energy complex of the country. We believe that the use of progressive Norwegian experience in the development of wind energy in the North West Federal district of the Russian Federation is relevant.

Methodology. The government of Norway pays considerable attention to qualitative reforms in the energy sector. The main directions of these reforms are improved efficiency, environmental protection, reduction of administration costs. Planning work in this area is carried out for the near future – 10 years, and up to 30-year period. The energy policy of Norway aims to achieve three main objectives formulated in the Energy strategy of Norway: (1) providing affordable, reliable and environmentally responsible supplies of energy; (2) creating competitive environment among the providers of "green energy" for affordable prices and reduced long-term volatility of energy prices; (3) sustainable consumption of green energy by improving energy efficiency and reducing greenhouse gas emissions.

The use of wind energy ensures the achievement of the above purposes. Wind power also extends the energy supply of remote settlements. Thus, wind power in Norway is considered as a tool for sustainable, flexible and environmentally friendly energy supply in changing political and climatic conditions. In this regard, the Norwegian Government encourages the development and diffusion of wind energy.

Climatic conditions and the wind regime in the North-Western Federal district of Russia ensure extensive use of wind energy in the fuel and energy complex of the region.

In the North-Western Federal district there are areas with high wind energy potential (annual average wind speed in these areas is 3 to 5 m/s and 5 m/s). These include: the Republic of Karelia, Kaliningrad Oblast, Arkhangelsk oblast, the Republic of Komi, Murmansk Oblast, Leningrad Oblast. Areas with high wind energy potential of coastal areas. As well as Norway, the North-Western Federal district of Russia has a high potential of offshore wind energy. Wind regimes of Norway and the North-Western Federal district of Russia allow to place wind turbines with a high number of hours (over 3000 hours). Despite the high wind energy potential in the Russian region, in practice it is almost never used. Many investment projects on the construction of wind energy generators have not been implemented. For intensive wind power development in the region it is necessary to: 1) improve the

investment climate in the sphere of realization of projects of wind energy; 2) establish a system of state support for green energy; 3) update the technical base of existing wind turbines.

Results and conclusion. The basic directions of applying the Norwegian experience in the development of wind energy on the territory of the northwestern Federal district are:

1) development of marine (offshore) systems of wind turbines for electricity supply of settlements which interrupted power supply.

2) updating the technical base of wind power through the application of high-tech units (for example, the Norwegian setting "Hywind").

3) creation of specialized non-profit organizations on the regulation and development of the wind power sector, by the example of Norway.

In conclusion. Humanity has always needed energy and its consumption is bound to increase. Wind energy is a regenerative branch of the world energy. In Russia, a creative approach to the regional policy in the field of "green energy" is able to open new prospects in the field of urbanization ecology.

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**TERRITORIAL PLANNING OF WASTE DISPOSAL IN THE
TVER REGION**

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Abstract: The article considers the system of solid waste management in the Tver region. It describes a method of landfill site selection using GIS and MCE. The hierarchical structure of the decision making problem was established by using AHP for the case study.

Key words: GIS, waste management, landfill site selection.

Waste is an essential consequence of the city life. One of the main tasks of the city municipal infrastructure management is competent waste management. Often the solution of this problem becomes problematic for municipal and regional authorities.

Relevance of the work is justified by the absence of the competent waste treatment management in the territory of the Tver region. Also, due to the specifics of the location and the features of the landscape of the Tver region, namely the close proximity of groundwater and wetland areas there are additional restrictions when choosing the site for the waste treatment facility.

Analysis of papers on the subject of landfill site selection has shown that this issue is not reflected enough in Russian scientific research. So we also reviewed international papers on this matter [1].

Summarizing Russian and international approaches and the current state of affairs in the field of waste management in Russia, we have developed a technique that consists of the following three stages of decision-making:

- 1) Macroanalysis.
- 2) Microanalysis.
- 3) Assessment, when the best accommodation variant is determined.

Tver region - the subject of the Russian Federation, is a part of the Central Federal District. In 2012, on the territory of the Tver region 110 illegal dumps were revealed, with the total area of 168,000 sq.m. According to the information provided by the Russian Federal Supervisory Natural Resources Management Service in the Tver region,

most landfills are technically outdated in this region, about 50% of landfills have been used over 30 years [2].

Thus, based on these data, we can conclude that in the Tver region there is a need to select a site for the landfill in order to organize the disposal of solid waste to reduce damage to the environment. Our attention was focused on the central part of the region, as near the city of Tver and in the Kalinin district the highest number of landfills has been registered and there is the greatest amount of waste here.

As a result of macro-analysis, we have a map that shows the area that is inappropriate and potentially suitable to host waste management facilities. In our case, at the stage of macro-analysis we excluded the following items residential areas, the territory of industrial plants, forest, conservation areas, bodies of water, roads.

Next 5 sites identified at the stage of macro-analysis and the corresponding required area were analyzed by 13 evaluation factors, including social, environmental and economic factors [3].

We have developed a set of evaluation factors for comparing landfill options and put values for each factor, and then each value was assigned a weight.

Then we evaluated the importance of factors by Analytic Hierarchy Process by Priority Scale Weighting. After that we tested connectivity index score - Connective index.

The index value was found to be 0.096, which is acceptable. If the value of the relevant index is within 0.1, the matrix of pairwise weighing is considered consistent [4, 5].

The most favorable site for the placement of waste treatment facility is the site near the village of Kurovo.

It should also be noted that during the construction of the landfill it will be necessary to take into account all measures to protect the environment. It is necessary to introduce a system for collecting and removing the filtrate.

Waterproof of the burial site foundations will help to eliminate the general rise of groundwater and the flooding of the territory [4].

The construction of the sanitary landfill, taking into account all measures to reduce the impact on the environment, as well as the placement of a waste sorting complex in the territory adjacent to the landfill, will enable integrated management of waste on the territory of the Kalinin district of Tver region.

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**REMOTE SENSING BASED MONITORING:
GLACIER CHANGES IN ALAARCHA AND ALAMEDIN
RIVER BASINS IN THE NORTHERN TIEN-SHAN.**

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Abstract. This paper presents the results of the area and linear retreat evaluation of Alaarcha and Alamedin glaciers in the Northern Tien-Shan in the period from 1964 to 2015, as well as the evaluation of surface elevation change of the Adygene glacier in the Alaarcha basin in the period from 1964 to 2010.

Key words: glaciers, glacier area change, glacier length change, glacier surface elevation change.

Introduction. Nowadays, remote sensing offers a valuable tool for gathering information about glaciers, which are remote objects, besides, this tool extends the scale of the study both spatially and temporally. The main objective of our study was to evaluate the shrinkage rate of the Alaarcha and Alamedin glaciers. Using available remote sensing techniques we focused on the area change and linear retreat of glaciers in both basins, as well as on the surface elevation change of the Adygene glacier in the period from 1964 to 2015.

Data and Methods.

Remote sensing data facilitates a rapid glacier detection and mapping and extracting the general topographic information.

During this study we used 1) the catalogue of glaciers compiled by N.L. Korzhenovsky in 1930 [1] and topographic maps with the scale of

1:50,000 drawn up in the 1960s to delineate the glacier boundaries, manually digitize the 20 m contour lines and spot elevations to generate a 30 m resolution DEM (digital elevation model) as of 1964. We also used the images of the Landsat-2/MSS taken in August 22, 1977/ and Landsat-8/OLI taken in September 11, 2015 to determine the glacier boundaries and area and length of glaciers. To estimate the glacier volume change of the glacier Adygene from 1964 to 2000, we used a digital elevation model SRTM 2000 and generated DEM from topographic map 1964.

Results.

1.1. Glacier area and length changes in Alaarcha and Alamedin river catchments.

A total of 125 glaciers were detected on the topographic map in Alaarcha and Alamedin river basins with a total area of 99,4 km². Most of them - 80 glaciers - are located in Alamedin and cover 60 km²; and 45 glaciers in Alaarcha with the area of 39, 8 km². According to the Landsat-2/MSS by the year 1977 there were 96 glaciers in Alaarcha and Alamedin river basins with the total area of 88,3 km²: 33 glaciers with the area of 36, 6 km² in Alaarcha and 63 glaciers in Alamedin covering the area of 51, 7 km².

The analysis of the Landsat-8/OLI and Google Earth images shows 106 glaciers and that glacial area shrank to 77,4 km²: 38 of Alaarcha glaciers with a total area of 31,7 km² and 68 Alamedin glaciers with the area of 45,7 km². Table 1 illustrates information about area change of Alamedin and Alaarcha glaciers in the period from 1964-1977 and 1977-2015.

Table 1.

Name of basin	1964-1977		1977-2015		1964-2015
	S (km ²)	%	S (km ²)	%	Total shrinkage %
Alaarcha	-3,2	-8	-4,9	-13,4	-21,4
Alamedin	-8,3	-13,8	-6	-11,6	-25,4

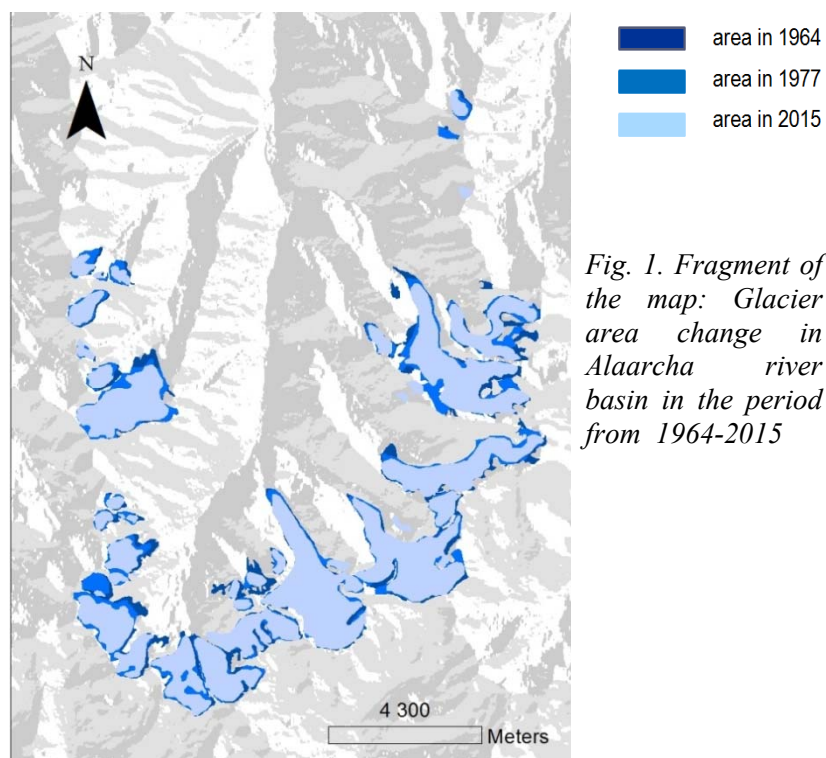


Fig. 1. Fragment of the map: Glacier area change in Alaarcha river basin in the period from 1964-2015

The analysis of glacier length change provides also information about glacier terminus retreat over the past decades. It was found out that the average retreat velocity constitutes 500-550 m in the recent 53 years; annually this is equal to 9-10 m a⁻¹. The following graph represents these trends for the largest glaciers in Alaarcha basin.

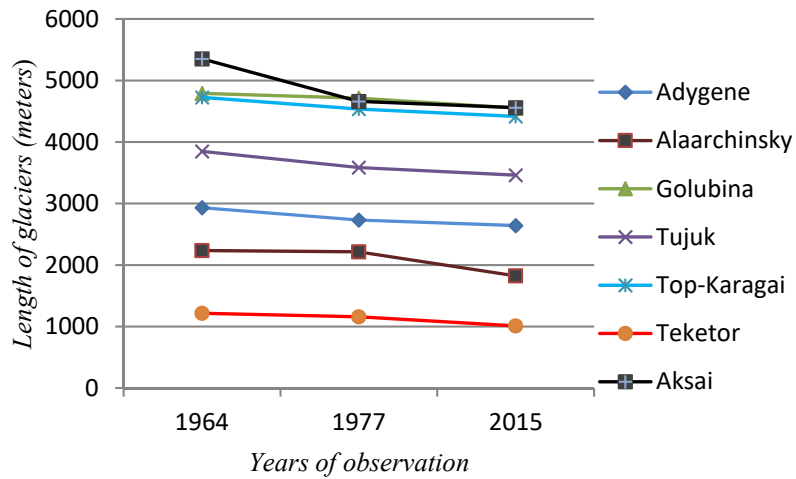


Fig.2. Length change of the largest Alaarcha glaciers.

1.2. Glacier surface elevation change: a case study from the Adygene glacier.

Using the methods described in the section Data and Methods, 2 DEMs for the years 1964 and 2000 for this glacier were built (fig.3). Comparison of these 2 models exhibits a dramatic change of the Adygene surface elevation: the volume has reduced by 0,003 km³ since 1964. The heights have decreased unevenly over the surface of the glacier, in average it constitutes -21 m, the maximal value of elevation change is -110 m. There are some areas with positive change of heights, which is likely controlled by avalanche activity: the maximal elevation increase is 38 m.

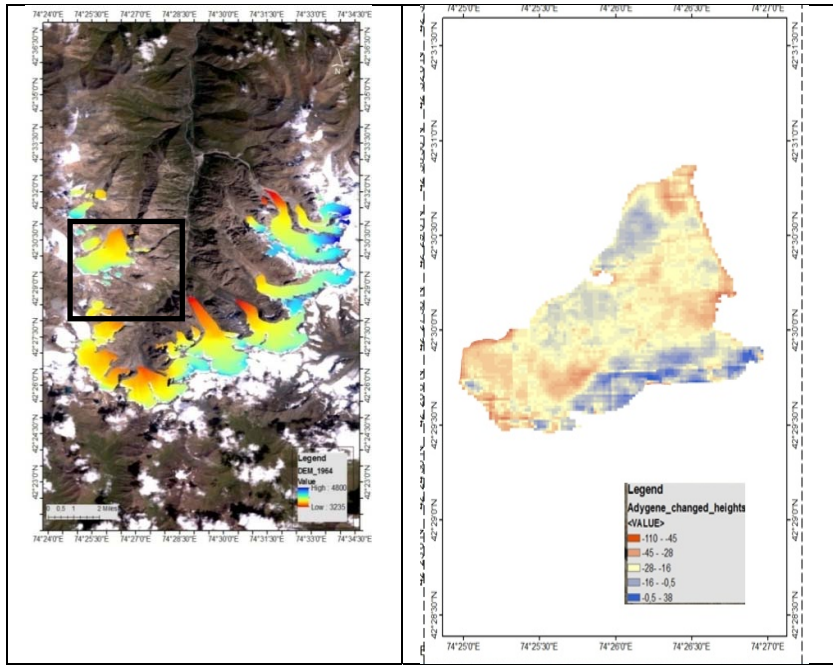


Fig 3. DEM models for the Alaarcha river basin used to calculate the Adygene glacier surface elevation change 1964-2000.

Conclusion. In this paper we have determined that the Alaarcha and Alamedin glacierized area has undergone a continuous change since the year 1964. The glaciers shrunk up to 21,4 % in Alaarcha and 25,4 % in Alamedin in their area, the average retreat velocity constitutes 500-550 m in the recent 53 years. It was also revealed that the glacier Adygene exhibits a dramatic change in its surface elevation: in average it constitutes - 21 m, the maximal value of elevation decrease is - 110 m.; moreover the glacier has lost around 0,003 km³ of ice.

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**DIE ROLLE DER NACHHALTIGEN ENTWICKLUNG
IN PETROPAWLOWSK-KAMTSCHATSKIJ**

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Abstract: The problem of sustainable development in distant regions with special climatic conditions.

Stichwörter: nachhaltige Entwicklung, Halbinsel Kamtschatka, Petropawlowsk-Kamtschatskij, Agrarindustrie, Hochschulbildung, Tourismus, Diplomfachleute, Hauptproblem, Arbeitsressourcen.

Die Halbinsel Kamtschatka ist im Kontext der nachhaltigen Entwicklung von Interesse. Das Klima ist dazu erforderlich. Im Rahmen eines Artikels wäre es günstig, auf kleinen Beispielen eine weitere Entwicklung der Region auf dem Grund schon vorliegender nachhaltigen Entwicklung zu zeigen.

Das Hauptproblem besteht in der schwachentwickelten Agrarindustrie in der Stadt. Der Ozean ist das Hauptunternehmen der Stadt. Daraus folgt, dass der große Teil der Bevölkerung lebt von Fischwarenindustrie, des Kaufes und des Wiederverkaufes des Fisches. Eine große Rolle spielen sowohl Metallurgie als auch Goldgewinnung. Es muss betont sein, dass die Entwicklung von neuen Industriezweigen von der Verbesserung der nachhaltigen Entwicklung zeugt.

Die Rede ist von der Entwicklung des Tourismus auf der Halbinsel. Betonwert sind auch die breiten gezielten Erholungsmöglichkeiten. Zweifelsohne ist es positiv für die hier lebenden Menschen.

Es muss versehen zu sein, die nachhaltige Entwicklung ist mit der Ausbildung der Bewohner eng verbunden. Leider hat die Hochschulbildung nur ein Viertel der Bewohner der Hauptstadt von Kamtschatka. Meistens ist es die Abwesenheitsbildung. Das bedeutet, dass fast niemand tief irgendwelchen Beruf erlernt. Es fehlen dort Diplomfachleute.

Gleichzeitig ist es zu beobachten, indem wir uns auf das gelehrtes Material basieren, dass sich die Nahrungsmittelindustrie aktiv entwickelt: die neuen Agrofarmen (die Reproduktion der Schweine, die aus Kanada stammen), die Rekonstruktion die Geflügelgroßfarmen, die

Gewächshauswirtschaft. Was der Treibhauswirtschaft betrifft, existiert schon jetzt die Entwicklung des innovativen Düngers aus den Fischabfällen. Aufgrund dieser Technologie ist das Gewächshaus schon aufgebaut, in dem die Pilze, Salate, das Gemüse gezüchtet werden. Als Ökologin bin ich besonders froh, wenn die vorliegende Technologie weit entwickeln würde, wäre das Problem der Fischproduktion gelöst. In Wirklichkeit wird eine moderne hocheffektive und fast abfallfreie Produktion bekommen. Bemerkenswert ist die Tatsache, dass eine aktive Arbeit an der Wiedergeburt der vorigen Viehzuchtgebäude durchgeführt wird. Besonders wird auf die Milchproduktion akzeptiert. Hauptproblem ist heutzutage der Mangel an Arbeitsressourcen. Die Region ist gezwungen, die Experten aus anderen Regionen zu mieten und einzuladen. Das Fehlen der Medizinhochschulen ist die Folge von keinen hochqualifizierten Fachleuten in dieser Branche. Natürlich war es richtig, hochqualifizierte Spezialisten aus Nachbarregionen Russlands heranzuziehen.

Trotzdem muss man die Anzahl der Hochschulen in Petropawlowsk-Kamtschatskij erhöhen. Ziel ist das Niveau des Professionalismus der zukünftigen Arbeiter zu erhöhen. Die Hauptsache ist, die Jugend davon zu überzeugen, die Hochschulbildung zu bekommen. Es ist real und notwendig. Es gibt die Möglichkeit in den perspektivischen Sphären zu arbeiten und sich damit zu beschäftigen, was gefällt.

Im Zusammenhang mit der nachhaltigen Entwicklung möchte man auf die Erhöhung des Lebensstandards der Menschen Petropawlowsk-Kamtschatskij aufmerksam machen. Untrennbar davon wird auch die Qualität der Arbeitsplätze erhöhen. Das ist nur die Folge. Der Hauptgrund besteht im Folgenden:

Petropawlowsk-Kamtschatskij hat das komplizierte Relief, das Gefälle der Höhen beträgt mehr als 500m, deswegen hat die Stadt mit der kleinen Einwohnerzahl sehr entladene Bebauung der Stadt. Infolge dessen sind die sozial bedeutenden Objekte aus einem beliebigen Punkt von Petropawlowsk-Kamtschatskij unerreichbar.

Deshalb soll sich das Verkehrsnetz, das heutzutage nur von den Bussen vorgestellt ist, entwickeln. Für heute entsprechen nicht alte Busse allen Schwierigkeiten des Reliefs in der Stadt zurechtzukommen.

Schlussfolgerungen:

Es war nur ein kleines Beispiel der nachhaltigen Entwicklung in einer konkreten Region, das für die weitere Entwicklung empfehlenswert ist.

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**DEVELOPMENT OF A SYSTEM OF SUSTAINABLE
DEVELOPMENT INDICATORS FOR THE CITY OF KAZAN
ON THE BASIS OF THE STRATEGY OF SOCIAL
AND ECONOMIC DEVELOPMENT OF THE MUNICIPALITY
OF KAZAN UNTIL 2030**

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Abstract: We defined a system of indicators of the sustainable development of Kazan, the capital of the Republic of Tatarstan. In our view it will be possible according to these indicators to assess the degree of the city's approach to its sustainable development with the purpose of subsequently determining the directions of the city's development and ways of its implementation.

Key words: urban sustainable development, sustainable development indicators, Kazan.

Introduction. In the last decade a large number of research papers are devoted to the search for sustainable development criteria of countries, regions and communities. In 2015 the UN adopted an

Agenda for Sustainable Development until 2030, with 17 sustainable development goals, one of which devoted specifically to the sustainable development of cities and communities [1, p. 3]. However, our analysis of the actual Russian Federation documentation shows that the bulk of the developed indicator system of sustainable development concerns large territorial units, paying little attention to the urban development.

To realize the UN's goal the Federal Law No. 172 "On Strategic Planning in the Russian Federation" [2] came into force in 2014. According to this law in 2016 some large Russian cities (Volgograd, Rostov-on-Don, Yaroslavl, Kazan) elaborated the strategies choosing the criteria for priority directions, but the indicators ad hoc have not been yet developed practically by the local authorities. Therefore the aim of our research is to determine the system of indicators for a sustainable development of the capital of the Republic of Tatarstan basing on the strategy signed by the Kazan City Duma in December 2016 [3].

Methodology. In the course of the work, we studied and analyzed the choice of goals, objectives and priorities of the social and economic development of the city and revealed three groups of criteria:

1. Advanced world practice and actual science data;
2. Priorities for the local development [3];
3. Values of city residents [3, p. 52].

Results. Relying on the first group of Strategy's criterions we presumably identified four areas of the development of these criterions, which can be matched with the categories of sustainable development criterions developed by the United Nations Commission on Sustainable Development after the UN Conference in Rio de Janeiro, which are: social, economic, institutional and environmental categories.

As a result, after we had analyzed all three groups of criterions which were base for the choice of the goals, objectives and priorities of the social and economic development of Kazan according to the Strategy, we presumably marked out the parameters that could be considered as indicators of the Sustainable Development of Kazan (see Table 1).

Table 1. Parameters considered as indicators of the Sustainable Development of Kazan according to the Strategy for the socio-economic development of the Republic of Tatarstan until 2030.

Category	Parameters
Social	People, their health and well-being (including housing and work), security; space, infrastructure, ecosystem for providing reliable protection, supply and communication between people; formation and accumulation of human capital; creating a comfortable space for the development of human capital
Economic	Population of the city and its agglomeration, the number of foreigners, the passenger turnover of the airport, the cost of living, the length and passenger subway flow, the number of billionaires living in the city and the gross product, innovations and the most advanced technologies, primarily information (“big” data, Internet of things); the creation of economic relations to develop human capital [4].
Institutional	Organization and management of society; the involvement of citizens in the urban management, knowledge and leadership; creation of public institutions to involve human capital.
Ambient	Energy conservation, use of renewable energy sources, recycling, motorless or electric motor transport, minimizing harmful emissions into water and atmosphere, people-friendly and eco-friendly urban environment, gardening, inclusion in the natural landscape.

Discussion. Therefore, we propose to assess the degree of approximation of the city of Kazan to its sustainable development using the sustainable development indicators which we have identified. We assume that these indicators will help to determine the state of the society, the city and its environment for the definition of goals for the further development of the city and the ways of their implementation.

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WATER RESOURCES AND ECOLOGY: MONITORING, POLLUTION AND RESTORATION(IN MOZAMBIQUE)

Mozambique

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Abstract: Water resources are the existing waters of our planet that are available for human use. However, it is worth mentioning that although it is within our reach, it is a duty of all to care, preserve and most importantly to use this water in a rational and conscious way, since it is indispensable for the life of all living beings on earth. When we break this balance, it will certainly greatly harm people's lives and consequently the health of the entire planet.

Key words: Mozambique (south part of Africa), Manica, Sofala and Niassa(provinces of Mozambique).

Introduction. The purpose of this article is to analyze the use of water resources in Mozambique.

Research. Mozambique is a downstream country, the rivers are the main largest water resources in the country.

Mozambique is vulnerable to disasters caused by climate irregularities. In recent years, the country has frequently experienced

droughts, floods and cyclones causing negative impact on social and economic development.

The monitoring of water in Mozambique is still at a low level because the pollution of water resources is still at large percentages. The most common problems in Mozambique in relation to surface water resources are:

- Mineralization manifested through salinity and electrical conductivity, which registers higher values in international rivers.

- The saline intrusion, at distances between 20 and 40 km from the mouth, is another environmental problem that occurs most frequently in the rivers of the south and center of the country.

- Water pollution caused by mining activities is also an environmental problem. The pumping of mineralized water out of the mine to the surface waters results in the pollution of these waters since several toxic products are used in the treatment process of the minerals.

Although the use of agrochemicals in the country is still very low, there is a real risk of contamination and eutrophication of surface waters.

- The industry is the sector of activity that most pollute water resources, because water is used as solvent or chemical reagent in washing, cooling and dyeing, and it becomes absolutely inappropriate for other uses. Once the water has been used, it is discharged into surface water, which is laden with highly toxic substances, which inevitably leads to severe ecological imbalances and poisoning of groundwater itself.

- Modern agricultural and livestock farming presupposes the use of chemical fertilizers (to compensate for the loss of soil nutrients) and pesticides (used to combat various pests, which may be herbicides, insecticides or fungicides) which, in addition to the degradation of water resources, than underground, causes pollution as we have seen before.

- Mining activities also have a significant impact on surface, groundwater or groundwater as a result of the release of large quantities of waste, some of which are extremely toxic. The impacts of gold mining activity on surface water courses in the provinces of Manica, Sofala and Niassa are already well known, given the use of mercury, a

chemical that causes significant damage to ecosystems, biodiversity and human health.

- In turn, the various domestic activities lead to the dumping of huge quantities of polluting substances in water resources without any previous treatment, and the consequences are therefore particularly serious. In the particular case of our country, the issue of poor sanitation in urban settlements is very worrying. Sanitation and drainage systems do not work. Even if the water supplied by the network is of good quality, it will not be for a long time, as it runs the risk of contamination by the sewers at any point along the way.

As a result of all these factors affecting the ability of most citizens to have access to water in a minimally acceptable quality and quantity, we have witnessed a number of outbreaks, with particular emphasis on cholera. This is associated with the enormous problem of the absence of effective systems of sanitation of places of implantation of people. Moreover, latrines are often erected on unsuitable grounds, causing contamination of groundwater and also contributing to the emergence of such cholera and diarrhea.

Denouement:As mitigation measures it is suggested to:

- Strengthen capacities and skills for monitoring and evaluation of water resources.

- Monitor the quality of water, giving priority to stations located in close to the border, large reservoirs and sections downstream.

- Ensure appropriate plans and measures for flood and drought mitigation.

- Develop capacity to deal with water quality issues, ecological flows, infestations of aquatic plants, monitoring of pollution.

- Promote physical planning and public awareness of good use of the land, in order to protect water resources.

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DIE UMWELTPROBLEME IN DER ARKTIS
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Abstract: The article is dedicated to the pollution problems of the Arctic. The aim of the work is to show the importance of ecological problems in the Arctic.

Stichwörter: der Klimawandel, der Meereis, die Ozonlöchern, der Arktisregion, der Klimadoktrin, die Naturschutzflotte.

Die Arktis ist ein Gebiet neben dem Nordpol. Sie umfasst die Ränder der Festländer Eurasiens und Nordamerikas, fast die ganze Arktische Ozean mit den Inseln, und ebenso den Teil des Atlantischen Ozeans und den Pazifik. Die Fläche der Arktis ist 27 Mio. km². Die Veränderungen der Umwelt in der Arktis können die Veränderungen den ganzen Planeten beeinflussen.

Heutzutage sind mehrere ökologische Probleme in der Arktis bekannt: das Schmelzen der arktischen Eise, der Klimawandel, die Verschmutzung des Wassers in den Meeren durch die Abflüssen des Erdöles und chemische Mittel, die Verschmutzung der Luft, die Reduzierung der Populationen der arktischen Tiere und die Veränderung ihrer Reichweite.

In der Arktis erhöht sich jedes Jahr die Temperatur. Es führt zum Schmelzen des Gletschers und dem Klimawandel.

Nach einigen Daten wurde das Schmelzen des Meereises am Ende des vorigen Jahrhunderts sehr beschleunigt. In den letzten 30 Jahren wurde die Dicke der Gletscher auf die Hälfte verringert. Viele Experten vermuten, dass zum 2070 die Arktis vollständig verschwinden kann.

Das zweite Problem der Arktis ist die Verschmutzung des Wassers und der Luft wegen der Industrie, des Transportes und der Militärobjekte.

Die verschmutzte Luft führt zu den sauren Regen und zu den Ozonlöchern.

Das dritte Problem der Arktis ist die Reduzierung der Tierarten. Außer ökologischen Probleme, die die Vielfältigkeit der Tierarten der Arktis bewirken, verringert sich die Anzahl der Tierarten wegen der Wilddieberei.

Außerdem gibt es in der Region die große Menge der Objekte, die die Strahlungsgefahr darstellen. Es ist das Kolskaja Atomkraftwerk, hier stationieren sich und werden die atomaren Schiffe repariert. An der Küste Barents- und Weißesmeer sind die Objekte der Aufbewahrung des nuklearen Brennstoffes deponiert.

Am Ende des vergangenen Jahrhunderts haben die Menschen verstanden, dass die Arktis ein brüchiges Ökosystem ist und sie den Schutz braucht.

In 1991 haben acht arktische Länder - Kanada, Dänemark, Island, Norwegen, Russland, Schweden und die USA die Strategie nach dem Schutz der Umwelt der Arktis (AEPS) beschlossen.

Im Jahre 1996 haben die Außenministerien der Region von Arktis die Deklaration von Ottawa unterzeichneten. Es wurde der Arktische Rat organisiert, der die ökologische Sicherheit in der Arktis gewährleisten sollte.

Auf dem Territorium arktischen Russlands werden zusätzlich Programme nach dem Schutz der Region entwickelt. Es wurde der komplexe Plan der Realisierung der Klimadoktrin der Russischen Föderation auf die Periode bis zum 2020 behauptet.

Vom Jahr 2012 bis 2015 wurde auf den Inseln "Nowaja Semlja" und "Franz-Joseph-Land" die Reinigung des Landes von den Abfällen durchgeführt. Es wurden die Schäden beseitigt, die den Territorien für die letzten Jahrzehnte vergiftet hatten. Es war mehr als 42 Tausend Tonnen verschiedener Abfälle eingeführt und 349 Hektare der Erden wieder hergestellt.

Künftig nach dem Jahr 2021 wird Russland die Naturschutzflotte für 3,1 Mrd. Rubeln aufbauen. Der Bau der Flotte ist ins Programm der sozial-ökonomischen Entwicklung der Arktis aufgenommen. Dieses Projekt wird zulassen, die Sicherheit der Meertätigkeit zu erhöhen und die ökologischen Risiken für die Meerökosysteme zu verringern.

Außerdem wird das Unternehmen "Admiralitätswerften" das spezielle Schiff für die Forschungen in der Arktis aufbauen. Das Projekt stellt

den schwimmenden Bahnsteig "der Nordpol" dar. Sie wird für das Studium des Meereises, der Atmosphäre und der Ökologie der Arktis verwendet werden. Der Bahnsteig soll dem Gelehrten helfen, auf den Zustand der Natur zu folgen und ihre Ganzheit in der Zukunft aufzusparen. Auf dieses Projekt wird der Staat 7 Mrd. Rubeln herausgeben.

Schlussfolgerungen

Die Arktis ist der wichtige Teil unseres Planeten.

Die geringsten Veränderungen in diesem Ökosystem können zu den globalen Veränderungen auf der ganzen Erde führen. Die Zerbrechlichkeit des Öko-Systems Arktis.

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IMPACT OF CLIMATE CHANGE ON THE GUINEAN AGRICULTURAL SECTOR

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Abstract:

The life cycle of construction materials includes all stages of production starting with raw materials, transport, material manufacturing and the installation in the built environment, subsequent operation, disposal or reuse. The production of construction material is the most significant in carbon accounting terms.

Key words: Guinea, Climate Change, Agricultural, water scarcity, raise of temperature.

Introduction: Covering an area of 245857 km², Guinea is divided into 4 natural geographical regions, each with its own

agroecological specificities. The country is bathed by more than 1150 streams divided into 23 river basins including 14 transboundary waters, which earned it its name of water tower of western Africa. Its climate is tropical and characterized by the alternation between the rainy season (April - October) and the dry season (November - March), with a rainfall of 1988 mm, and an average annual temperature ranging from 25 to 29 degrees Celsius.

General overview of the agricultural situation in Guinea:

Guinea is an agricultural country. The sector employs more than 75% of its labor force, accounting for 14.2% of its GDP. Agriculture is practiced in all parts of the country. Guinea has more than 6,200,000 ha of cultivable land, from which only 25% is used and 10% is managed annually. The main agricultural crops are Rice (67%)* and maize (12%)* followed by groundnuts, citrus fruits, fonio, millet, sorghum and cassava.

Climate change scenarios:

In this work 4 models will be analyzed, all based on the scenario A1B of the Intergovernmental Panel on Climate Change.

An analysis of the 4 scenarios indicates a clear drop in precipitation in the center and in the north of the country, these precipitation falls reach -100mm per year in the CSRIO Mark 3 GCM models and the ECHAM 5 GCM model. The zone that will not be affected by the precipitation is the coastal region, with an increase of up to 200 mm per year according to the scenarios CNRM-CM3 GCM and MIROC 3.2 medium-resolution GCM. The forest region, although not affected by the general fall of the precipitation, is subject to drastic falls that could reach -400mm according to the MIROC 3.2 medium-resolution GCM model, which makes it the lowest decline in all of these scenarios.

The average annual temperature across the country is expected to increase by less than 1.0 ° to 1.5 °, however the CNRM-CM3 and ECHAM models predict peaks of 2.5 ° to 3.0 ° in Upper Guinea, especially in the north, north-east of the country.

The combined effects of falling rainfall and rising average temperatures will increase water scarcity, which will obviously affect agricultural activity.

The effects of climate change on agricultural yields:

Always on the basis of the 4 previous models, an analysis of agricultural yield, with the year 2000 as the reference, shows losses in the order of 5-25% of the yield of the rice crop in the ECHAM 5 and MIROC 3.2, these losses are greater in the forest region, with a loss peak of more than 25% in the Macenta region.

The numbers are much more alarming for Maize crop, with reductions of more than 25% in almost all models.

The population is expected to double by 2050 according to the lowest scenario. This will increase the country's demand for food and other basic social needs. Thus, food cover should be affected, with an increase in the rate of child malnutrition in the 2020s before decreasing in the year 2050.

Conclusion:

The analysis of the different scenarios shows a clear vulnerability of Guinea to global warming, and shows the fragility of its food cover. Thus the impact of climate change should not be surprising for the Guinean agricultural sector.

It is necessary, however, to emphasize the relativity of these consequences, which can be mitigated by a greater modernization of the mode and techniques of agricultural production.

It will also be necessary to take measures to adapt to global warming, such as the development of hydraulic infrastructures for irrigation and water retention in order to cope with the shortage of water which will be corollary to the rise of temperature and the general decline in rainfall.

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**GENERAL EFFICIENCY ANALYSIS OF NATURAL PARKS IN
VOLGOGRAD REGION**

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Abstract: Analysis of protected area SPNRs, their conservancy value and significance were considered. It allowed to make conclusions of the current state of the parks and areas in Volgograd region.

Key words: SPNR, conservancy value and significance, environmental efficiency.

In terms of areal conservancy, SPNR systems are an effective way and, as distinct from single SPNR allow to realize ecosystems protection and regional objects systemically and comprehensively. The SPNR system is a complex of single protected areas which united in SPNR system. This system is also the partial unit of an ecological structure.

In Volgograd region, there is not top rank SPNR, for example, natural reservations and national parks. However, the natural parks are a basis of the protected ecosystem in region. It means that the natural parks are crucial protected units which contribute to conservancy value and significance for the SPNR system. Today there are 58 SPNRs where 52 SPNRs are systems of regional importance and 6 SPNRs have the local importance. The total area of 988,2 thousand hectares is 8,67% of the total territory of Volgograd region. The natural parks provide the protection of zonal and introzonal landscapes.

The method of environmental efficiency evaluation for specially protected natural areas and their regional systems by M.S. Stishov was realized as fundamental methodical approach. This is due to the method that ranked score assessment by aggregate parameters such as representativeness, contrast with environment and current state of protected area characterize 5 main functions for each single SPNR in region and system as a whole. The result is the total environmental efficiency resulting from environmental value and significance evaluation.

Considering that the natural parks are crucial units of SPNR system and have the top rank in Volgograd region contributing to environmental value and significance, environmental efficiency calculation of SPNR system can be realized by the natural parks calculation as main categories in region.

In Volgograd region the natural parks realize all functions of environmental efficiency such as reference, refugium, reserve, “monumental” and eco-stabilizing. They are supported by high level of representativeness and contrast with environment which lead to high level of environmental value. However, the current state of the natural parks is not relatively high. This is mainly due to the influence of different factors such as human impact on protected area, natural and ecological features of region and each SPNR, historically established system of management.

In total the SPNR system of Volgograd region realizes the environmental efficiency by 69% with average total magnitude of environmental value and significance of 118 and 81 respectively, and with the maximum possible value of the total average value and significance of 195. This current situation is defined by high human impact on the protected areas, unimprovable layout problems (especially for the “Nizhnehopersky” and “Eltonskii” Nature Parks) and natural factors of compelling force (aridity increase for Trans-Volga region).

In Volgograd region the environmental efficiency of the SPNR system can decrease without taking preventive measures against existing threats even in sustainable environment conditions. However, the functioning efficiency of the SPNR system will be not reached of 100% by respectable measures due to irresistible factors of natural features. Nevertheless, system supporting helps to save it on high level

and also increase the environmental efficiency of the SPNR system in Volgograd region.

One of the most perspective existing opportunities of the functioning optimization for regional SPNR system is creation of new perspective protected areas, expanding and changing of configuration for existing areas, creation of conserved corridors between the SPNRs and protective zone surrounding protected areas not only within region but also between neighboring ones. It will not only decrease the human impact on the SPNR but also help to create a full ecological structure for region area.

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**THE FACTORS OF SUSTAINABLE DEVELOPMENT IN THE
TRANSCAUCASIAN COUNTRIES
(on the example of the Republic of Armenia).**

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Abstract: The article examines the indicators of sustainable development, which have practical application today in the world. Their definitions, basic properties and characteristics are given in the article. An analysis of the use of environmental indicators for the Transcaucasian countries on the example of Armenia is also conducted.

Key words: Sustainable development indicators, World Bank, Energetics, sustainable development, Armenia.

Introduction. Sustainable development indicators are designed to standardize the collection of data on indicators of interest and to simplify the methods for calculating the required data. Unfortunately, there is no a unitary standard for sustainable development indices, and many countries or unions of countries and associations are establishing their own systems for regulating and calculating the key indicators and strategies for sustainable development.

In 2008, Armenia adopted the Sustainable Development Program, which defined the main activities as follows: ensuring sustainable economic growth and social protection of vulnerable groups of population and improving public administration, including effective management of natural resources and preservation of the environment. The program sets quantitative targets for each area under consideration,

for example, poverty reduction, economic growth, public administration, innovation and technology, agriculture, drinking water supply, transport, energy, etc.

Methodology: The indicators of sustainable development are called the criteria that help assess the current state of the geographical region, predict its coming future, draw conclusions on the stability of that state [1]. The term “state” here means the economic, social, ecological, and institutional development of the region.

There is a basic set of indicators for sustainable development. They serve as a base for planning the activity in sustainable development and designing the policy in this field.

The environmental indicators include water, land and other natural resources, atmosphere, waste.

Unfortunately, there is very little data on the ecology of the regions of Armenia, as far as the main emphasis is being done on the development of the economy, including the economy of the electricity sector.

Research: Since data on the environmental situation in Armenia are incomplete [2], the data of the World Bank on the environment will help to correct the overall picture of the environmental situation in the Republic.

It is necessary to consider the sustainable development factors for the Republic of Armenia [3] as follows. These indicators will be able to give an overall picture of the state of the environment and energy in Armenia and other countries of Transcaucasia for the lack of detailed data from the states.

There is the Development Strategy of Armenia for 2014-2025 [4], which indicates the development of the economy, infrastructure (which includes drinking water, irrigation, transport and energy), as well as regional development.

The main thrust of the Program is to develop only the economic component of the region. This situation looks incomplete, one-sided and will not fully help forward the development of the state.

Conclusion. The National Statistical Service of the Republic of Armenia (NSS) is currently developing a DSP system. The work is supported by UNDP. At present the development of the system is close to the stage of completion.

For international comparison 13 indicators are singled out, 31 for the analysis at the national level and 60 for more in-depth analysis (for a regional dimension of sustainable development at the level of an ecological region that is not limited to one state).

All components of sustainable development must necessarily be included in the development strategies of the states, and they must be fully functional and fully functioning. This will make possible to clearly analyze the situation with the development of the country and the region and forecast it for many years to come.

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DISTRIBUTION OF THE GENUS CEDRELA IN ECUADOR

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Abstract: The genus *Cedrela* in Ecuador has four species: *C. odorata*, *C. montana*, *C. fissilis* and *C. nebulosa*. *Cedrela* was one of the economically most important timber in the past, due to its wood properties; as a consequence a substantial genetic degradation have occurred. Currently, three species of *Cedrela* are included in the IUCN Red List.

In spite of their conservation status and priority, few studies related to geographical distribution have been done. Field sampling and herbarium compilation showed *C. montana* is restricted to the Ecuadorian highlands in the western and eastern Andean montane region between 805 to 3200 masl. *Cedrela nebulosa* is located in Andean region about 1400 to 2300 masl. *C. odorata* is the most widely distributed, occupying areas in the Amazon (200-1300 masl), Pacific (330-825 masl) and insular regions (350 masl). While, *Cedrela fissilis* is only found in the Amazon Region about 200 to 510 masl. This basic information about current geographic distribution and abundance of cedar species is primordial to generate sufficient tools to formulate the strategies of management and conservation of these species in the country.

Keywords: *Cedrela*, endangered species, ecoregion, altitude, distribution, deforestation.

Introduction. Ecuador has one of the highest rates of the Continent according to the Food and Agriculture Organization of the

United Nations (annual rate of 1.8% for the 2001–2010 period) and the main causes are related to urban sprawl, expansion of agricultural and pasturelands, lack of adequate government policies, high demand for timber products, logging and forest fires.

In Ecuador, the genus *Cedrela* P. Browne (Meliaceae) includes 4 species: *Cedrela odorata*, *C. fissilis*, *C. montana* and *C. nebulosa* (Palacios, 2011). These species have shown a huge decrease in their population size and distribution due to their high quality timber. The anthropogenic impacts trigger the genetic diversity diminish and generate problems in the conservation and management policies of these plants (Paiva, Buono & Delgado, 2007). As a consequence of the selective logging of cedar, *C. fissilis* is an endangered species and *Cedrela odorata* is considered as a vulnerable species (IUCN, 2016).

Despite the economic and ecological relevance of the genus *Cedrela*, studies on the current status and the distribution of its species in Ecuador are scarce (Palacios, 2011). This study provides information about the distribution of *Cedrela* genus in Ecuador, which can be a valuable contribution to the management of these species.

Methodology. Georeference data was obtained of herbarium specimens from the National Herbarium of Ecuador (QCNE), Herbarium of the Pontificia Universidad Católica del Ecuador (QCA), Ministry of the Environment (MAE) and Walter Palacios, the expert in Meliaceae. In addition, data was included from field collections of the Phylogeography of *Cedrela* (Llerena *et al.*, 2012). Two hundred forty seven specimens (247) were collected and georeferenced (Garmin Etrex Summit and Magellan Meridian Platinum GPS).

The map of geographical distribution of the genus *Cedrela* in Ecuador was generated using data collected and vegetable formations division of the continental Ecuador (Sierra *et al.* 1999; Olson, 2002). ArcGIS 10.3 Software was used in this study.

Results and discussion

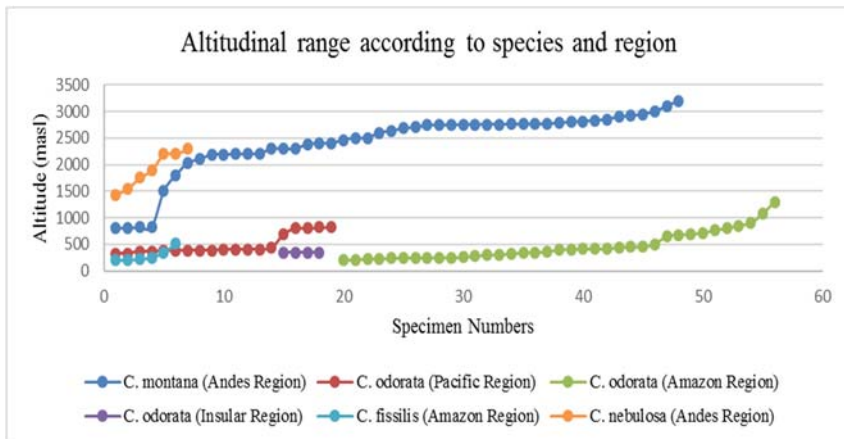
On large scale, there was a clear division in the geographical distribution of Cedar species in Ecuador: *Cedrela montana* is distributed in the Andean Region between 805 and 3200 meters above sea level; *C. nebulosa* in the Andean Region in heights between 1420 to 2300 masl; *Cedrela odorata* was the most widespread species located in three regions: Pacific (330-825 masl), Amazonian (200-1300 mas;)

and Insular region at 350 m. *Cedrela fissilis* was found only in the Amazon Region at elevations between 200 and 510 masl (Fig. 1 and 2).

As shown in Figure 2, the most widely distributed species was *Cedrela odorata*, found in the following Ecoregions: Lowland Evergreen Forest of the Amazon, and Flooded Lowland Forest of the Amazon at heights from 200 to 1300 masl. In the Pacific Region it was presented in Lowland Evergreen Forest, Piedmont Evergreen Forest of the Coast Mountains and Deciduous Forest of Lowlands, at heights from 330 to 825 masl. In Galápagos Islands *c. odorata* was found in the Xeric Scrub Ecoregion at 350 masl.

Figure 1. Scatter plot of Cedar species distribution by altitudinal range and region

Cedrela montana was restricted to the Andean Region in the following Ecoregions: Lower Montane Evergreen Forest and Montane



Mist Forest of the Western Andes, Lower Montane Evergreen Forest of the North and Central Andes, and High Montane Evergreen Forest of the Eastern Andes in heights between 805 and 3200 masl. In the previous Ecoregion and in the Montane Mist Forest of the Eastern Andes, the species *C. nebulosa* was also located in heights between 1420 to 2300 masl. *Cedrela fissilis* appeared only in the Amazon Region in the Lowland Evergreen Forest and Flooded Forest of the Amazon at heights between 200 to 510 masl (Fig. 2).

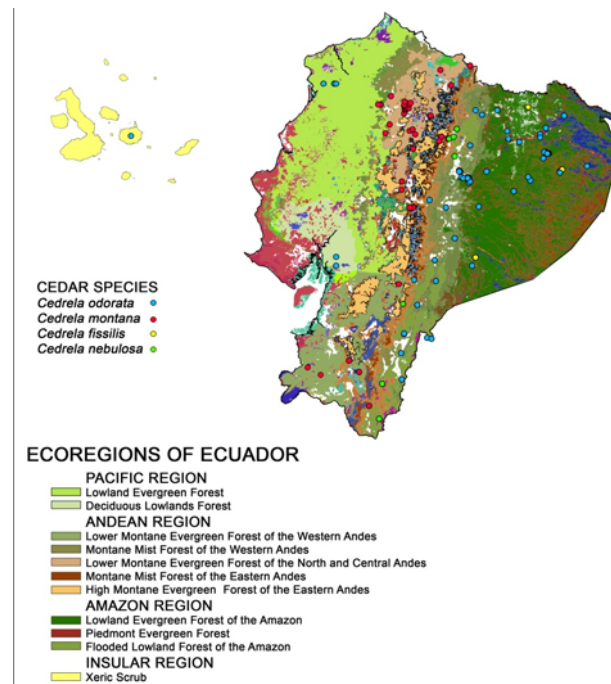


Figure 2. Map of *Cedrela* Distribution in Ecuador based in the plant formations classification of Sierra *et al* (1999) and Olson (2002). Symbology: *C. odorata*, blue circle; *C. montana*, red circle; *C. fissilis*, yellow circle and *C. nebulosa*, green circle (ArcGis 10.3).

The regions where *Cedrela* species were located are enclosed in three different biodiversity hotspots. *C. odorata* in the Coast Region (Mache Chindul Ecological Reserve and Maglares Churute Nature Reserve) is located in Chocó-Darién-Western Ecuador Hotspot. Both, *Cedrela odorata* and *C. fissilis* in the Amazon and *Cedrela montana* is in the Hotspot of the Tropical Andes.

Cedrela montana was restricted to the Andean Region in the following Ecoregions: Lower Montane Evergreen Forest and Montane Mist Forest of the Western Andes, Lower Montane Evergreen Forest of the North and Central Andes, and High Montane Evergreen Forest of the Eastern Andes in heights between 805 and 3200 masl. In the previous Ecoregion and in the Montane Mist Forest of the Eastern Andes, the species *C. nebulosa* was also located in heights between 1420 to 2300 masl. *Cedrela fissilis* appeared only in the Amazon

Region in the Lowland Evergreen Forest and Flooded Forest of the Amazon at heights between 200 to 510 masl (Fig. 2).

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The *C. odorata* distribution determine that is adapted to two habitat types: tropical rainforest and tropical monsoon where the climate is warm dry and warm humid in the regions of the Central and Insular Coast and in the North Coast and Amazon Regions, respectively. Adaptations due to growth in different regions have been recorded in previous studies (Navarro, Ward & Hernández, 2002).

The leaves of *C. odorata* sampled in dry and humid environments showed differences in size. In addition, in the research developed by Llerena *et al.* (2012) about molecular phylogenetics of Cedar in Ecuador using chloroplasidic genes cpDNA and transcribed internal spacers (ITS) was suggested a possible incipient speciation and / or a subspecies status over *C. odorata* populations. The two lineages found for this species were correlated with the region of distribution, one from the Central Coast Region and Insular Region (dry climate) and the other from the North Coast and Amazon Region (humid climate). Finally, *C. fissilis* was the least dispersed and in a lower altitudinal range, it was located only in the Amazon region.

Conclusion

The distribution of cedar has been observed to be restricted to tree main regions depending of each species. All of these regions coincide with highly deforested areas, hence, *Cedrela genus* must be consider a priority conservation group due to their vulnerability to extinction as a result of anthropogenic activities that destroy or modify the environment. In order to have a good reforestation management, the actual distribution and the habitat preferences of each species must be considered.

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**THE IMPACT OF ACID MINE WATERS ON THE
LANDSCAPE OF THE KIZEL COAL BASIN**

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Abstract: The change of hydrogeological conditions in the territory of Kizel Coal Basin resulted in chemical pollution of ground water and subsequent spout of water to the surface that has a negative impact on the environment of the region.

Key words: acidity, groundwater, coal, mine water, technogenic landscape.

Technogenesis is an interrelation of geochemical, sedimentological, biological, hydrogeological, other processes occurring in the upper lithosphere, where the intense engineering activity leads to the changes in the environment [1]. Technogenic landscape is characterized by the influence of industrial activity where number of particular extensive forms of agricultural and forestry land-use as well as the whole biotope diversity could be changed.

The Kizel coal basin is located in the middle Urals, in the Eastern part of Perm region. The relief is low mountainous, with longitudinal systems of hills, divided by river valleys. The river network in the territory is quite extensive and includes numerous tributaries and streams. The continental climate determines the mountain-taiga forests and podzolized, loam soils [2].

A feature of the Kizel coal basin is the formation of acid mine water because coal seams contain pyrite. The oxygen and water create the conditions for the formation of ferrous sulfate and sulfuric acid. Pyrite oxidation in mine waters led to the formation of large amount of iron hydroxide precipitation. The area of sedimentation is constantly increasing, spreading to tens of meters. The huge volume and high content of pollutants of mine water have a strong negative impact on

the environment of the Kizel coal basin, in particular on surface water, which flows into the Kama river basin.

The spills of acidic mine water affect the natural conditions of the territory, completely destroying the vegetation and changing biogeocenosis community and decreasing the biodiversity of the region.

One of the methods to improve the ecological situation in the territory of the Kizel coal basin is the construction of sewage treatment plants with neutralization of acid mine waters. Table 1 includes the results of experimental neutralization of mine water with lime solution (CaO 1750 mg/l).

Table 1. Chemical analysis of mine water

The sample of acid mine waters	Fe, mg/l	Be, mg/l	Al, mg/l	pH
<i>Before the experiment</i>	926,96	0,0163	42,10	3
Threshold limit value, mg/l	0,1	0,0003	0,04	6,5-8,5
<i>After the experiment</i>	<0,05	<0,0001	0,13	8

At present time, the Kizel coal basin is at the post-operational stage. The consequences of technogenesis include: the alteration of projective cover degree, the formation of depressions, slumps, failures, displacement of the landslides, the formation of chemically contaminated mine waters, their entry into the surface water objects, the pollution of rivers and sedimentation of iron hydroxide inside the stream channels and near the shores. All the factors of technogenesis require technical solutions to prevent the negative effects of acid mine waters [2,3].

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**MODEL OF FUZZY RISK EVALUATION OF PROJECTS FOR
THE CONSTRUCTION OF COMMUNICATION TUNNELS IN
COMPLEX URBAN ENVIRONMENTS**

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Abstract: The article is devoted to the solution of scientific and practical task of improving the quality of construction of communication tunnels due to the choice of the best design decisions. The authors developed the approach of comparative analysis of design solutions of the communication tunnels' construction based on a comprehensive evaluation of fuzzy risk. The results of comparative analysis of design options for the construction are present in the article.

Key words and phrases: project, communication tunnel, security, environmental security, uncertainty, risk.

Introduction. In modern conditions designing of urban underground structures is associated with a certain degree of risk. In most cases, security is provided by normative models and coefficients that are applied to groups of corresponding structures. Responsibility for project security can be achieved by processing the standards documents for the use of the project. They take into account unusual and random loading: earthquakes, floods, mudslides, strong winds, fires in tunnels, etc. But it is important to perform this analysis during the project preparation stage to the choice of the design option based on assessment of uncertainties and their impact on the construction project.

Methodology

Considering engineering and technological features of the construction of communication tunnels, and especially the environment of the project implementation of the problem in question (Geology, major city, dense underground and surface development, high population density, etc.) three main factors have been identified that arise in the implementation of the project and have a largely significant effect on the integral parameters: geological uncertainty factor (F1), the factor of uncertain site (F2), building uncertainty factor (F3). To assess the impact of these factors on the integral characteristics of the construction project (such as, for example, the depth of the tunnel lining, slope, alignment, diameter, etc.) the expert rules [1] and the methodology of evaluation of projects were developed based on the calculation of the influence $V_{F_i K_j}$ of the uncertainty factor (Fi) and the degree of influence $Z_{F_i K_j}$ of the uncertainty factor (Fi) on the integral indicator (Kj) [2].

When you develop expert rules to describe the parameters and their estimates it is proposed to use fuzzy formalisms. Each of the rule elements is described using several Boolean variables (3÷5): “high,” “upper average,” “average,” “below average,” “low”. In figure 1, there is an example of membership function for linguistic variable “high,” “average” and “low” for the strength of rocks.

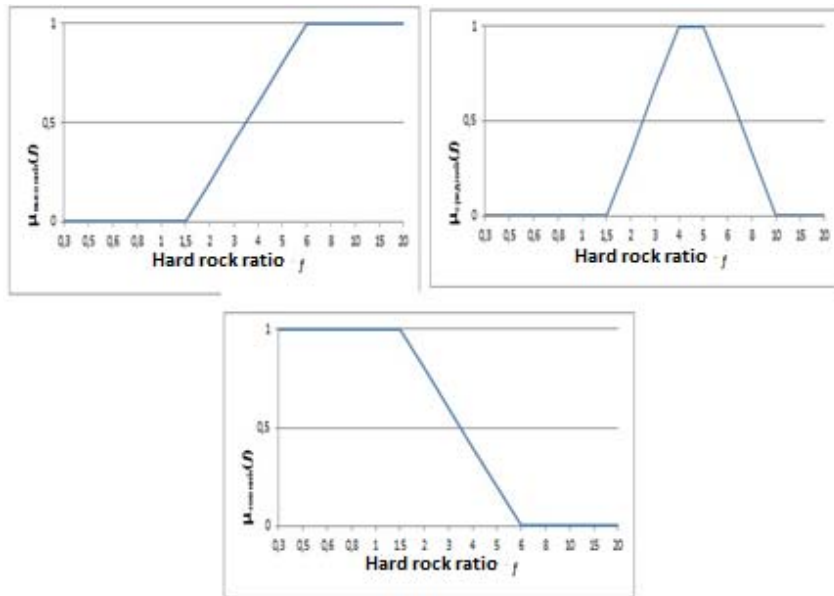


Figure 1. The membership functions of linguistic variables “high,” “average” and “low” for the strength of rocks

Thus, the model of fuzzy risk (R) integral index K_j of the project of construction of communication tunnel is determined by calculating a fuzzy risk for each uncertainty factor, which, in turn, is obtained by evaluating the influence and impact of uncertainty on K_j :

$$\left. \begin{aligned} V_{F_1 K_j} \wedge Z_{F_1 K_j} &\rightarrow R_{F_1 K_j} \\ V_{F_2 K_j} \wedge Z_{F_2 K_j} &\rightarrow R_{F_2 K_j} \\ V_{F_3 K_j} \wedge Z_{F_3 K_j} &\rightarrow R_{F_3 K_j} \end{aligned} \right\} R_{K_j} \quad (1)$$

Figure 2 shows the General scheme of the assessment model of fuzzy risk integral index of the project in the form of a block diagram.

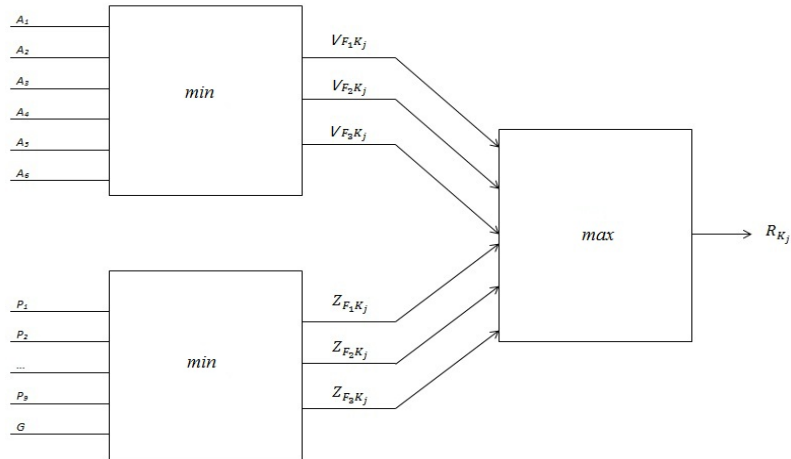


Figure 2. The General scheme of the model of fuzzy risk assessment for the integral indicator of the construction project of CT

Identifying the impact of factors on the overall risk to the integral index is based on the fuzzy associative matrix (table.1).

Table 1. The possibility and degree of influence factor

The possibility of the influence factor	high	average	average	above average	high	high
	above average	below average	average	average	above average	high
	continuation of table 1					
	average	below average	below average	average	average	above average
	below average	low	below average	below average	average	average
	low	low	low	low	below average	average
The degree of influence of factor	low	below average	average	above average	high	

In the future, when a rule is difficult to operate with facts that are represented in linguistic form, so you will need to encode the original set of rules and generate the source inductive table.

The resulting model provides a choice of design options for the construction of the tunnel communication in conditions of uncertainty for many integrated indicators (economic, organizational, technological), which is implemented with minimal risk.

Results and conclusion

As an example of the use of this mechanism the choice of two design options has been considered for the construction of communication tunnel (D_1 and D_2) based on the risk assessment of mining of the uncertainty factor (F_1) for the integral indicator of "construction time" (T) for the conditions of the construction site of the sewer tunnel under MZHD savelovskoe direction on the object "Reconstruction of Lianozovsky passage from Dmitrovsky sh. to Cherepovetskaya street".

As the result of calculations, the following results have been obtained:

$$V_{F_1T}(D_1) = 1.55 \text{ and } Z_{F_1T}(D_1) = 6.59 \rightarrow R_T(D_1)=3.63$$

$$V_{F_1T}(D_2) = 1.79 \text{ and } Z_{F_1T}(D_2) = 4.76 \rightarrow R_T(D_2)=2.74$$

These results show that the risk of deviation of the actual value of the integral indicator (timing of implementation) of the design value under the given conditions of the construction site for the second project is smaller, i.e., the risk that they violated terms of project implementation is less than in the case of chosen technological solution D_2 .

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**EMISSION INVENTORY OF CARBON DIOXIDE FROM
 TRAFFIC ACTIVITIES OF HIGHWAY 217 IN THE THANH
 HOA PROVINCE OF VIETNAM**

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Abstract: The report presents results of emission inventory of air pollutants such as Carbon dioxide (CO₂) from road traffic sources in HW217, Thanh Hoa province in Vietnam.

Key words: Carbon dioxide (CO₂), traffic source, highway 217 (HW217), emission inventory, estimates of emission pollutants, Thanh Hoa, Vietnam.

Introduction. Emissions inventory of pollutants in general and CO₂ in particular, from the source of road traffic is conducted annually beginning in the developed countries and developing country in Southeast Asia to collect information pollution how current and forecast for the future, serving strategy to protect air environment in all countries. In Vietnam, this problem has been research interest in recent years in the provinces through the small projects. But the results are

still limited because there is no methodology and uniform procedure. Our researches build inventory methodology CO₂ emissions in air due to the traffic activities in general and the highway 217 in particular and road network in Vietnam.

Methodology.

1. The method of monitoring the flow of vehicles in traffic

Using the observation method of OLE mean count vehicle at a specific time on the cross section perpendicular to the route. Monitoring was carried out simultaneously in the selected fixed time period 24 hours/day. Users have the ability to monitor the vehicle counts in the most appropriate conditions is only a 30 minute vehicle count in one hour, then breaks and calibrates monitoring equipment in 30 minutes remaining time. Results extrapolate the number of vehicles in one hour is doubled. For big road with 2 opposite route should use the device camera to continuous monitoring, count also for small road directly by popular devices (mechanical counting devices provided by Japan).

2. Method calculation CO₂ emission

The inventory analysis includes data collection and calculation procedures for the purpose of quantitative definition of the corresponding input and output data flows from the production system.

A. Calculation Formula for CO₂ Emission Estimation

CO₂ emission has been calculated by using the following formula applied by the European Chemical Industry Council (Cefic) [2]:

$$\begin{aligned} \text{CO}_2 \text{ emission} &= \text{Traffic volume by vehicle type} \\ &\quad \times \text{average travel distance} \\ &\quad \times \text{CO}_2 \text{ emission factor (gCO}_2 \text{ per km by vehicle type} \\ &\quad \text{by travel speed)} \end{aligned}$$

Source: Guidelines for measuring and managing CO₂ emission from freight transport operation, European Chemical Industry Council (Cefic), 2011

B. Categorization of Vehicle Type

Due to the limitation of CO₂ emission factor applicable to the calculation, the vehicles for this estimation have been categorized in three (3) types as motorcycle, light car, and heavy car. The bus and

truck are categorized as heavy car in this estimation to align with the applicability of CO₂ emission factor by vehicle type [1].

C. Calculation Formula for CO₂ Emission Estimation

Future traffic volume in Highway 217 has been estimated, according to the report of Emission Inventory of Air Pollutants from Road Traffic Sources in Project Management Unit 1 of Ministry of Transport in Vietnam, under the premise that the traffic volume would increase by the average of 18,87%/4 years.

Table 1: Traffic Volume of the Highway 217 up to 2020

Vehicle type	Traffic volume 1) (In 2016)	Traffic volume 2) (up to 2020)
Motorcycle	1.575 unit/24h	1.842 unit/24h
Light car	264 unit/24h	372 unit/24h
Heavy car	414 unit/24h	563 unit/24h

D. Average Travel Speed of Vehicle

The average travel speed of vehicle has been set as shown in Table 2.

Table 2: Average Travel Speed of Vehicle

Item	Distance (km)	Average Travel Time (minutes)	Average Travel Speed (km/h)
Baseline Case (2016)	194,5	531.2	21.97 (approx. 20)
2020	194,5	284.5	41.02 (approx. 40)

E. CO₂ Emission Factor

CO₂ emission factor, which is considered to be tailor-made to the Hanoi or Vietnam situation, is not available. Thus, the emission factors have been set under the categories of light car and heavy car responding to the average travel speed abovementioned, by quoting from a research report titled “Grounds for the Calculation of Motor Vehicle Emission Factors using Environmental Impact Assessment of Road Project (MLIT Japan, 2012).”

On the other side, the CO₂ emission factor for motorcycle has been set according to the research report titled “Quantifying Emission

Reduction from Transport Solutions (World Resources Institute, 2008)”. The factor in this estimation available for motorcycle for Vietnam is not responded to the average travel speed, and is responded only to travel distance.

Table 3: CO₂ Emission Factor

Ave. Travel Speed (km/h)	CO ₂ Emission Factor by Vehicle Type (g/km/unit)		
	Motorcycle ¹⁾	Light Car ²⁾	Heavy Car ²⁾
20	39.6	176.1	909.5
25		157.3	828.4
30		143.9	760.0
35		133.9	704.3
40		126.4	658.8
45		120.9	622.5
50		117.0	595.2
55		114.5	576.0
60		113.0	566.9
65		112.8	564.6

Source:1) Table 9, page 21, Quantifying Emission Reduction from Transport Solutions (World Resources Institute), 2008

2) National Institute for Land and Infrastructure Management, MLIT, Japan, Quoted only in the range between 20km/h and 65km/h, from page 8-50, Table 8.23 (1), 2010-version as the latest.

Results of Rough Estimation of CO₂ Emission

For calculation of a carbon footprint of life cycle of insulation materials, processes were analyzed and models of production of insulators were created.

Table 4 shows the results of rough estimation of CO₂ emission on each of three (3) cases, including the key features for estimation.

Table 4: Results of Rough Estimation of CO₂ Emission

Item		2016	2020
Nos. of Vehicle (unit/24h)	Motorcycle	1,575	1,842
	Light vehicle	264	372
	Heavy vehicle	414	563
Distance (km)		194,5	
CO ₂ Emission Factor (g/km/unit)	Motorcycle	39.6	39.6
	Light vehicle	176.1	126.4
	Heavy vehicle	909.5	658.8
CO ₂ Emission Amount (ton/24h)	Motorcycle	12.13	14.19
	Light vehicle	9.04	9.15
	Heavy vehicle	73.24	72.14
Total CO ₂ Emission Amount by Case (ton/24h)		94.41	95.48
Total CO ₂ Emission Amount by Case (ton/year)		34,459.65	34,850.2

In conclusion The CO₂ emission amount estimated up to 2020 would increase considerably with approximate 390.55 ton/ year, compared with the baseline case in 2016, in line with the increment of traffic volume on the Highway 217.

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**SOME ASPECTS OF ENVIRONMENTAL IMPACT
ASSESSMENT IN THE EXPLORATION OF MINERAL
DEPOSITS**

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Abstract: The article gives an assessment of the impact of the coal deposit to the environment. Also the article reflects the nature protection measures for the coal deposit.

Key words: industrial activities, project documentation, ecological, atmosphere, water, soil, land, pollution.

According to Article number 35 of the Environmental Code of the Republic of Kazakhstan [1], the environmental impact assessment (EIA) is a procedure which shows the possible results of economic and other activities for the environment and human health, creates the measures for preventing the adverse effects, improving the environment, taking into account the requirements of the environmental legislation of the Republic of Kazakhstan.

EIA is an obligatory procedure for planned industrial activities that have an impact on nature. Enterprises or organizations that have not passed the EIA procedure can not conduct production activities. The results of the EIA are an integral part of the preplanned, planned, pre-project and project documentation. During the EIA [2], before the implementation of the planned activity the proposed location of the production facility is considered. Also it is very necessary to make a

forecast of impact on nature from planned industrial activity, which can occur during the implementation of production in this area.

At the same time, the entire planned production process, technologies, equipment are taken into account. During the EIA we calculate what kind and how high the level of air, water, soil and land pollution will be. Also we calculate and describe what kind of industrial and communal waste can be generated.

The considered coal deposits are located in the valley of the Nura river in the Karaganda region of the Republic of Kazakhstan. The result of the EIA is the material, which describes the industrial extraction of the coal deposits and its potential impact on the environment.

Industrial development of the coal deposit is carried out on the territory which is already anthropogenically disturbed and additional intensification of exploration can increase soil degradation. It can happen because soil has a weak buffer against anthropogenic disturbing.

In this coal deposit the following works will be carried out: conveyor delivery of coal to the skip shaft; diesel-driven hauling; application of suspended diesel-hydraulic locomotives.

Potential sources of emissions of pollutants into the atmosphere which are located in the territory of the coal deposit are a technological complex on the surface; district heating; repair and warehousing; complex of coal wastes.

Approximately forty eight sources of emissions of pollutants into the atmosphere are identified during the analysis of the planned activities of the mine. From them twelve are organized, and thirty six are not organized. Twenty substances and nine groups of sums will be thrown into the atmosphere. Calculation of surface concentrations of pollutants emitted by sources of emissions in the surface layer of the atmosphere is an integral part of the EIA procedure and is carried out on a special program complex [2].

In order to reduce emissions of pollutants into the atmosphere from boilers (heating systems) it is planned to equip them with gas cleaning system and dust-catching equipment. In addition to these measures, it is very important to take the following measures which prevent environmental pollution:

- regularly perform routine maintenance and inspection of the dust-cleaning equipment;
- not to allow the storage of coal and rock outside the special areas;
- to optimize the technological processes performed in the territory of industrial sites;
- to do regularly monitoring of air pollution;
- to reduce or completely stop work during unfavorable meteorological conditions;
- to carry out work for the greening of the enterprise's territory.

As water protection measures, it is important to provide recycled water supply. It is very important to build the anti-filtration screen for industrial and municipal wastewater storage tanks. It will prevent dirty water filtration into underground horizon. It should be taken into account that emergency leakage of fuel and, also removal of turf and soil cover, can cause certain changes in the structure of biogeocenosis.

In order to reduce the negative impact, after the work, recultivation measures should be carried out. Recultivation is necessary for the disturbed lands of all categories, and the nearest land areas that have completely or partially lost agricultural productivity after technogenic impact.

At present time one of the most acute environmental problems is the industrial waste pollution. Concentrated in dumps, waste pits, unauthorized dumps wastes are a source of pollution of atmospheric air, underground and surface waters, soils and vegetation.

During the production process of the mine 18 types of waste: can be formed: ash and slag waste, aspiration dust, solid household waste, electrodes' wastes, metal's waste, woodworking waste and so on. Also, as a rule, waste rock is formed. But according to Ecological law, waste rock is a part of technogenic mineral formations.

During the assessment of the impact on the environment, it is important to identify all types, volumes and causes of the negative impact. It is important to identify this goal completely. If we have negative factors of influence, we should find ways to prevent them before the planned activity implementation. So it is more correct to prevent and revise production technologies at the design stage. To change technologies during of building and operating production is much more difficult and more expensive. And it is important to note

that it is almost impossible to repair the damage done to the environment.

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SPACE-TIME DYNAMICS OF THE MAIN NATURAL DISASTERS IN RUSSIA

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Abstract: The article contains the description of natural disaster trends in Russia and their causes.

Key words: natural disaster, disaster trends, calamities, economic damage, global process, solar activity.

Natural disaster is a rapid and intensive manifestations of natural processes, accompanied by large changes in landscapes and leading to excess mortality, morbidity, economic consequences and environmental changes.

The patterns of manifestations of disasters

- 1) Spatial association;
- 2) Repeatability of hazardous processes;
- 3) Dependence of the destructive effect on the intensity and duration of the process;
- 4) Synergism (mutual reinforcement of negative effects).

For a disaster at least one of the following criteria must be fulfilled:

- Ten (10) or more people reported killed
- Hundred (100) or more people reported affected
- Declaration of a state of emergency
- Call for international assistance

Among the natural disasters that occur in Russia during the period 1992-2016, there are earthquakes, extreme temperatures (cold and heat), floods, landslides, avalanches, storms and forest fires.

Due to the fact that Russia has a vast territory and accommodates several geographical zones and terrestrial ecosystems, it has a wide variety of natural conditions. => Exposed to almost all types of adverse events (about 30 species).

The most frequent and most widespread damage to human property and its physical well-being is caused by floods.

The most dangerous disaster in terms of the number of deaths is extreme temperatures.

Extreme temperatures (a long period of excessively hot or cold weather) occur mainly in the continental part of Russia, accounting for more than 90% of the deaths from all disasters. In the territory of our country, abnormally low temperatures occur much more often than high temperatures. Often there are two anomalies in one year.

Floods have the highest rates of deaths, injuries and economic damage both in Russia and in the world.

We created a map of the frequency of occurrence of natural disasters in the regions of Russia, which revealed that the most vulnerable regions are [1]:

- Moscow and Moscow region (cold, heat),
- Sakhalin Oblast (storms, earthquakes, floods),
- Krasnodar Krai (floods, fires),
- Irkutsk Oblast (floods, fires, cold),
- Khabarovsk Krai (fires, floods, storms),
- Zabaykalsky Krai (fires, floods, cold),
- The Republic of Dagestan (avalanches, earthquakes, floods);

From the federal districts Eastern Siberia, the southern part of the Far East, the eastern islands, the Caucasus and major cities can be identified.

During the period 1992-2016, 139 cases of natural disasters were recorded.

The sun contributes to the process of accumulation of energy of physical processes in the atmosphere, hydrosphere and lithosphere. Consequently, it can increase the catastrophic effect of these processes by several times.

A comparison of the number of accidents with the Wolf number is shown in the figure. The highest and lowest level coincide; Indicators are characterized by similar dynamics. There is a dependence between indicators and influence of solar activity on catastrophic processes.

In 2009, there was a drop in the number of disasters, a decline in solar activity, average air temperature and population;

It should be noted that during the period 1992-1999, the most common types of disasters in Russia were atmospheric phenomena (28%) and earthquakes (24%), floods were less frequent (19%). Until 2016 there was a significant increase in the number of floods.

In many sources, population growth indicates the cause of catastrophes. However, comparing the population growth and the number of disasters, we have found a very small relationship between these indicators. Year 2009, in which no major catastrophe was registered, was also marked by a drop to the minimum of the population of Russia, after that a tendency to increase is visible. From this we can conclude that natural disasters can be one of the factors affecting the population. The drop in population is caused by mortality due to disasters and a decrease in the birth rate.

Natural disasters in Russia and in the world have a similar temporal dynamics: in 2000, there was a maximum of them, also there is a tendency to decrease [2].

The dynamics of disasters in Russia and the world is similar: there is a tendency to reduction of their number.

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**CHANGE IN THE SOIL STRUCTURE OF GRAY FOREST
SOILS OF THE MOSCOW REGION IN CONDITIONS OF
A POSTAGROGENIC EVOLUTION**

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Abstract. Structural analysis of the samples gray forest soils of different ages deposits was carried out. The following values were calculated: weighted average diameter, structural coefficient, the number of agronomically valuable aggregates. The experimental results showed that in fallow soil with increasing age deposition processes gradual recovery soil structure occur to the initial zone type.

Keywords: structural analysis, postagrogenic soils, structural coefficient, soil structure.

Introduction. Starting from the second half of the 20th century, the general trend towards an increase in the area of agricultural and arable land persists. However, the speed of this process began to slow down significantly. It should be noted that Russia occupies the third place in terms of the volume of arable land, and in terms of the number of areas excluded from exploitation on the first. In addition to Russia, 94 countries show a marked decrease in the world [2].

In conditions of intensive plowing of lands, the structure of the soil profile in the upper part of the soil, the composition and structure of the upper horizons are disturbed. Once the arable land is no longer in constant agricultural use, i.e. there was abandonment of arable land, it begins a difficult recovery process, as the vegetation and soil fertility. The soil structure during fallow succession also undergoes significant changes [1]. Therefore, the task of the study is a comparative analysis of changes in the soil structure of gray forest soils in the course of their postagrogenic development. The following goals were set for the task:

1. Study of regularities of distribution and quantity of micro- and macroaggregates in various soil horizons
2. Assessment of the structural state of soils as their age increases

Methodology. The experiment was conducted on the basis of the laboratory of soil nitrogen and carbon cycles of the Institute of Physical-Chemical and Biological Problems in Soil Science, Russian Academy of Sciences in Pushchino. The objects of study were soil samples one chronological series representing former arable soils and deposits of different ages (9, 13, 22, 37 and 65). Soil samples were collected in the vicinity of Pushchino, Moscow region. Structural (aggregate) analysis of soil samples were determined by dry sieving point samples taken from four envelopes by soil layers: 0-5, 5-10, 10-20 and 20-30 cm [3]. For this 200 g of air-dry soil of natural constitution was released from the roots, then by hand for 2-3 minutes vigorously shaken on a sieve having a mesh diameter of 10, 7, 5, 3, 2 and 0.25 mm. Obtained fractions are weighed to an accuracy of 0.01 g and subsequently, taking into account the part in the total mass of the sample is determined by weighted average diameter (WAD, mm) of the aggregates for each layer, structure coefficient and the number of agronomically valuable aggregates.

Results. Analysis of the soil structure of the former arable soils studied chronological period showed that in general the contents in all layers macroaggregates number on farmland — fallow — forest line increases with age, and microaggregates content correspondingly decreases. The following dynamics of this process can be traced: in the upper layer (0-5 cm), the smallest difference in the content of microaggregates (2.7% of the mass) is observed, then in the 5-10 cm layer the difference between arable land and forest reaches the greatest value of 9.5% of the mass, and in the layers 10-20 and 20-30 we see a slight difference in the direction of decrease (9.4% and 8.8%, respectively) in comparison with the 5-10 cm layer. In addition to decreasing the proportion of microaggregates in the soil structure, it is evident that the content of macroaggregates is increasing, while the content of macroaggregates of larger size is more noticeable and occurs with increasing age of deposition. Thus, microaggregates "stick together" first into small aggregates (0.25-2 mm), from which macroaggregates of > 2 mm in size are formed.

Figure 1 shows that in the top 10 cm layer number of agronomically valuable aggregates (AVA) is 80%, which means their excellent state of aggregation. In addition, a significant increase in the number of AVAs occurs gradually with increasing age of the deposits.

Figure 2 shows that on the gray forest soil in the upper layer (0-5 cm) the structural coefficient under the forest is 2.1 times larger than over the farmland. No noticeable changes in the direction of growth in the lower layers are noted. Figure 3 shows that there is a trend towards an increase in the weighted average diameter of aggregates. However, a clear dependence on the age of occurrence is observed only for the lower layers of the soil. Thus, in the layer of 20-30 cm under the forest, the WAD of aggregates is 1.5 times more than under arable land. The maximum WAD value is noted in the 20-30cm layer and is 5.58mm for the 65-year-old forest. Also observed a marked increase in WAD values for the layer 10-20cm from arable land to 22 years' deposits, then the value of the WAD gradually decreases.

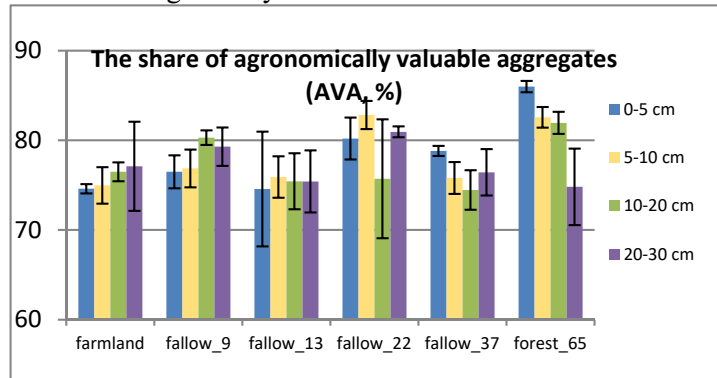


Figure 1. The share of agronomically valuable aggregates

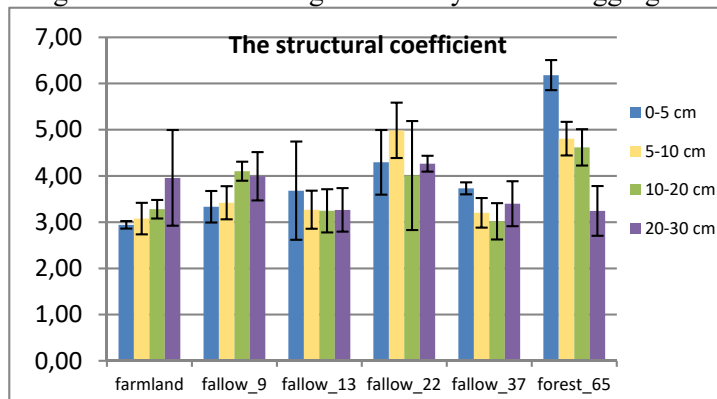


Figure 2. The structural coefficient

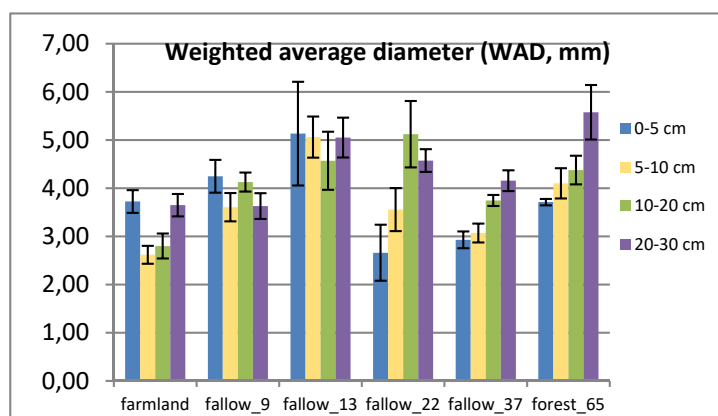


Figure 3. Weighted average diameter

Conclusion. Analysis of the structural composition of the former arable soils of the chronological period studied showed that, in general, the content of macroaggregates in all layers on farmland — fallow — forest line increases with age and the content of the microaggregates, respectively, decreases. The structural coefficient of the former arable layer, in the course of the postagrogenic evolution, tends to grow. This indicates that during the development of land after their withdrawal from agricultural use, the agrophysical properties of the soil are gradually improving. Arable gray forest soils after their removal from agricultural circulation gradually restore the structural organization in the direction of the initial zonal type.

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Abstract: Ecological zoning on the basis of combinations of soil, landform and climatic characteristics focuses attention on the climatic and edaphic requirements and on the management systems. Combination of land use factors of several zones of the Kaluga region have been studied to make recommendations designed to improve the existing land-use situation. The purpose of zoning for rural land-use planning is to reveal areas with similar sets of potentials and constraints for development. As a result specific programmes are to be formulated to provide the most effective support to each zone actual rational use of land resources and to nature protection measures development.

Key words: ecological zoning, rational nature management, landscape-ecological zoning, regional sustainable development.

Introduction. Today the interaction between society and nature resulting from intense industrial growth throughout the world on the basis of existing technologies [1] that produce a diversity of by products has attained dimensions that are so extreme that they threaten to mankind's very existence [2], both through the depletion of natural resources and through the pollution of man's environment that is dangerous to his life [3].

Methodology. Interpretation of space images of areas of Dzerzhinsky district of Kaluga region is a basis we used to mark out following trends in ecological planning. Ecological zoning defines zones on the basis of combinations of soil, landform and climatic characteristics. The particular parameters used in the definition focus attention on the climatic and edaphic requirements and on the management systems. Each zone has a similar combination of constraints and potentials for land use, and serves as a focus for the targeting of recommendations designed to improve the existing land-use situation, either through increasing production or by limiting land degradation [2].

Outputs of core applications include maps showing ecological zones and land suitability, and quantitative estimates on potential crop areas. Such information provides the basis for land-use optimization modeling (Figure 1).

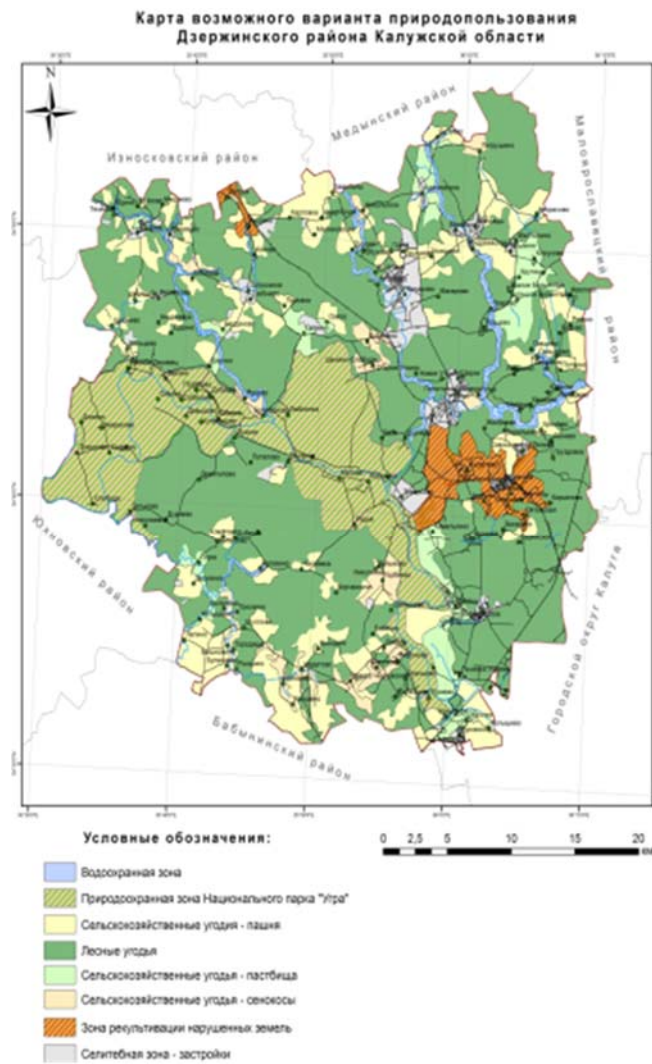


Figure 1. Land-use optimization modeling for Dzerzhinski district of the Kaluga region, Russia

Results. The purpose of zoning, as carried out for rural land-use planning, is to separate areas with similar sets of potentials and constraints for development. Specific programmes can then be formulated to provide the most effective support to each zone [4]. The result was to create a map of the possible rational nature management of Dzerzhinsky district. On the basis of previously created cards, we have identified 4 types of nature management: background, large-focal, focal and dispersed. The types we have also allocated types: agricultural, forestry, residential, industrial, recreational use of natural resources. Thus the map of the possible rational nature management of Dzerzhinsky district of Kaluga region may be useful not only for solving some applied problems of nature, but also, importantly, for the purposes of regional planning.

Conclusions. Landscape and ecological planning can become a universal instrument of spatial development and elaboration of a new economic projects and environmental programs in Kaluga region. Ecological zoning can be regarded as a set of core applications, leading to an assessment of land suitability and potential productivity, and a further set of advanced or peripheral applications.

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**RADIOECOLOGICAL ASSESSMENT OF THE STATE OF THE
TERRITORY ADJACENT TO THE URANIUM LEGACY SITES**

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Abstract. In order to meet the requirements of radiation safety in the rehabilitated area, it is now necessary to introduce a radiation monitoring system, the contents of which must be economically justified. Thus, the state of the territory has to be assessed. This work aims to assess the radiological state of the territory adjacent to one of the uranium legacy facilities, namely Lermontov production association "Almaz" (LPA "Almaz").

Key words: activity of natural radionuclides, the dose rate of gamma radiation, the natural sources of ionizing radiation, the average volume activity of radon, radiation dose, soil.

Uranium legacy sites are such radiation hazardous facilities, where uranium ore was extracted and processed. Irradiation at the sites where uranium was mined is formed from natural radionuclides. While the territories with the increased content of natural radionuclides in soils were in untouched condition, they did not pose a danger. The areas of radiation contaminated land in the territories of former uranium production facilities are vast, a significant part of the territories is rehabilitated, others need rehabilitation and require solutions.

The aim of the work is radioecological assessment of the state of the territory contaminated with natural radionuclides.

The results obtained will serve as the basis for justifying and developing measures to improve the ecological situation in the territory of the study object.

Methodology. The object of the study is the territory of the city of Lermontov, adjacent to the former mining enterprise Lermontov production association "Almaz" (LPA "Almaz"), which was engaged in the extraction of uranium ores from 1950 to 1990.

Measurement of the equivalent gamma radiation dose in the territory was carried out by means of pedestrian gamma radiometric survey in accordance with the methodic MRK-REM-66-14 with the help of devices of the DRG type.

Sampling of soil was carried out in accordance with the procedure of methodic MRK-REM-69-06, using the "envelope"

method. Samples for the content of natural radionuclides were measured on a gamma spectrometer CANBERRA b10188.

Volumetric activity measurements were carried out using the kit TREK-REI-1M by an integrated method.

The evaluation of individual effective radiation doses of the population because of radon-222 was made in accordance with the methodical instructions [1].

The following indicators were used as criteria for assessing the environmental state in the territory: average regional values of the determined parameters; limitations for natural radionuclides in accordance with the Norms of Radiation Safety (NRB-99/2009) (effective specific activity (A_{eff}) and annual effective dose).

Results and conclusion. In the process of study, the measurements of radiation parameters in the territory of Lermontov city were made. The average value of the equivalent gamma radiation dose in the territory is $0.19 \mu\text{Sv/h}$ and it does not differ significantly from the regional average for the Stavropol Region ($0.15 \mu\text{Sv/h}$). In this territory, we identified areas, where the maximum of the equivalent gamma radiation dose was observed.

A total of 20 control points have been selected and 20 samples of soils were taken for the further measurement of the activity of the main natural radionuclides (U-235, Th-232, Ra-226, K-40) in them. Based on the data measured, the effective specific activity (A_{eff}) was calculated. The average value of the A_{eff} does not exceed the limitation of 370 Bq/kg . Soils with such A_{eff} belong to Class 1 for natural materials and, therefore, are permitted to be used without restriction in the residential areas.

Due to the high content of uranium and radium in the soil in this area, it is necessary to control the radon content. The National Research Centre of Radiation and Chemical Safety and Hygiene of Russia provided the data on the volume activity of radon. Buildings to be assessed were located near the control points. In total, 7 buildings were assessed.

The calculation of the equivalent equilibrium volume activity of radon in them was carried out. The results were compared with the limitations for natural radionuclides, and the limitations were exceeded by two times. In order to assess the impact on the population, the annual effective dose was calculated.

Table 1. The estimation of the annual effective dose

Building	Annual effective dose, mSv/year	Exceeding the limit, times
Kindergarten #4	3,73	0,75
Kindergarten #5	4,68	0,94
Kindergarten #11	5,41	1,08
School #5, building 1	4,42	0,88
School #1	3,51	0,70
School #5	5,89	1,18
School #2	3,18	0,64
Minimum	3,18	0,64
Maximum	5,89	1,18

As shown in table 1, the calculated value of the annual effective dose due to radon exceeded the limitation in two buildings.

The revealed excess is insignificant, which means that radon monitoring in this territory and in residential and public buildings is required.

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**ИЗМЕНЧИВОСТЬ АГРОКЛИМАТИЧЕСКИХ УСЛОВИЙ
РОСТОВСКОЙ ОБЛАСТИ В УСЛОВИЯХ МЕНЯЮЩЕГОСЯ
КЛИМАТА**

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Аннотация. В статье дана оценка изменчивости агроклиматических условий Ростовской области в связи с изменчивостью климата. Показано, что на территории области отмечаются изменения температурного режима, режима выпадения осадков и других агроклиматических характеристик.

Abstract. The article assesses the variability of the agroclimatic conditions of the Rostov Region in connection with climate variability. It is shown that changes in the temperature regime, the regime of precipitation and other agroclimatic characteristics are noted on the territory of the region.

Ключевые слова: изменчивость климата, ландшафт, температура, осадки, коэффициент увлажнения.

Keywords: climate change, landscape, temperature, rainfall, rainfall factor.

На сегодняшний день тенденция увеличения температуры приземного воздуха в глобальном масштабе признается всеми учеными без исключения. Однако, анализ литературы показывает, что существуют различные оценки и прогнозы, климатических изменений, и их влияния на отрасли экономики и природные системы, причем оценки эти могут носить диаметрально противоположный характер [1].

В этой связи перед нами ставится цель дать оценку изменчивости агроклиматических условий территории Ростовской области на фоне меняющегося климата.

Нами для территории Ростовской области проведена оценка агроклиматических условий на основе данных метеорологических станций Гигант и Ростов - на - Дону за период с 1966 по 2015 гг. Данные этих метеостанций репрезентативны для степных ландшафтов Ростовской области, которые доминируют на изучаемой территории.

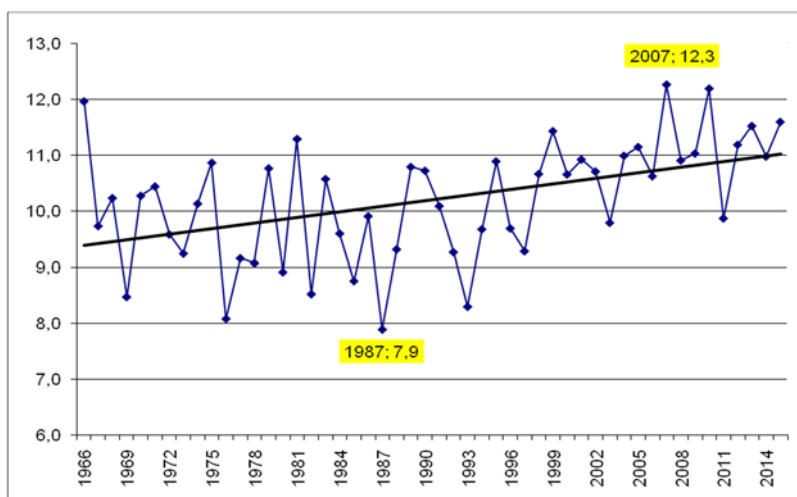
Оценка изменчивости агроклиматических условий производилась на основе анализа таких показателей как:

- изменчивость температуры и осадков;
- сумма активных температур;
- гидротермический коэффициент;
- коэффициент увлажнения;
- продолжительность вегетационного периода;
- опасные метеорологические явления.

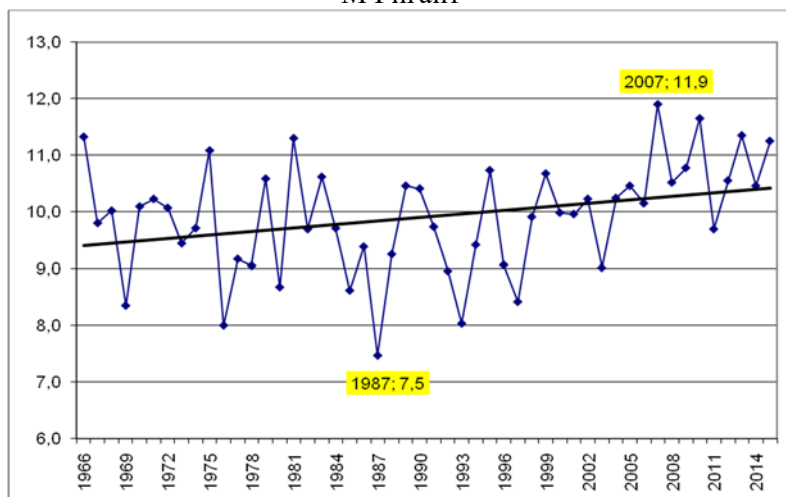
За исследуемый период по всем метеорологическим станциям самым холодным оказался 1987 год, самым теплым – 2007г. (рис. 1).

Температура в среднем выросла на 1,1°C. За исследуемый временной отрезок во всех месяцах отмечается превышение средней температуры в сравнении с нормой. Существенный вклад в увеличение температуры внесли месяцы холодного периода: ноябрь-апрель.

Анализ изменчивости суммы активных температур за 1966-2015 гг. показывает, что за исследуемый период среднее значение суммы активных температур оказывается выше нормы, а период вегетации увеличивается на 15-16 дней (табл.1).



М Гигант



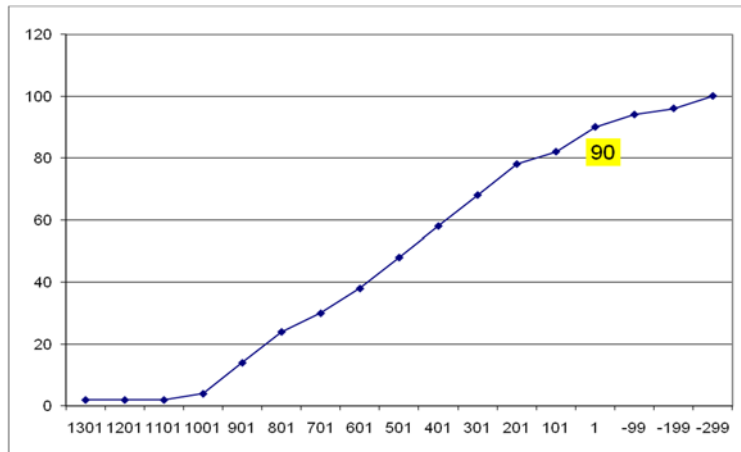
М Ростов-на-Дону

Рисунок 1. Графики изменчивости температуры воздуха за 1966-2015 гг.

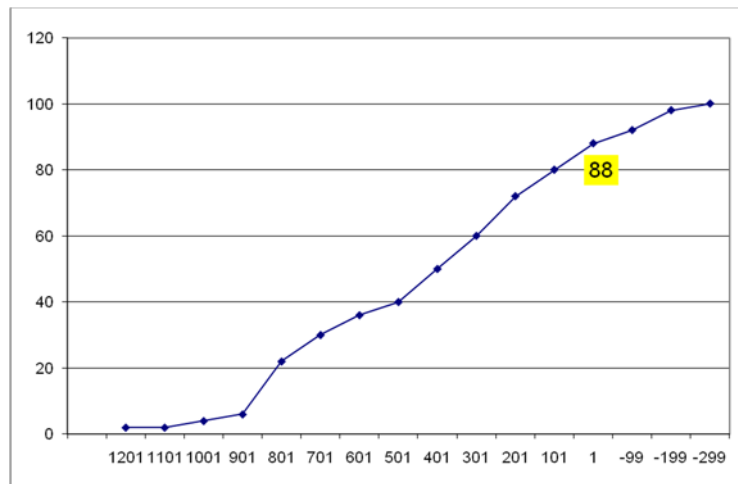
Таблица 1. Изменчивость суммы активных температур и периода вегетации растений в Ростовской области

	Гигант	Ростов-на-Дону
Min	2823	2780
Max	4392	4252
Среднее	3516	3431
Норма	3038	2990
Разница	477	441
Отклонение периода вегетации (в днях)	16	15

Нами проведена оценка обеспеченности среднегогодового значения суммы активных температур ($> 10^{\circ}\text{C}$) за период с 1966 по 2015 гг., которая показала, что отклонение от нормы в сторону увеличения температуры отмечается в 44 – 45 случаях из 50, что составляет 88-90%. Это говорит о том, что в 1966-2015 гг. в 88-90% случаях отклонение отмечается в сторону увеличения суммы активных температур (рис.2).



Гигант

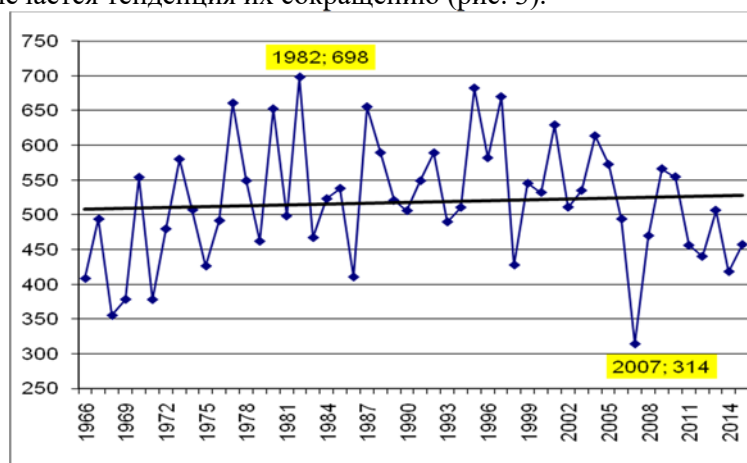


Ростов-на-Дону

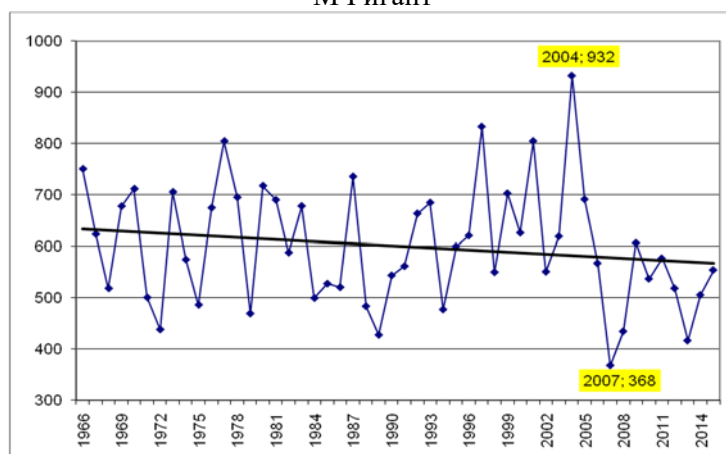
Рисунок 2. График обеспеченности суммы активных температур за 1966-2015гг.

Самым сухим и жарким можно назвать 2007 год, в этот год отмечались максимальные температуры за весь исследуемый период и выпало минимальное количество осадков.

Увлажнение территории неравномерно. Количество осадков выросло на 45-68 мм, однако, для метеостанции Гигант линейный тренд характеризует тенденцию к увеличению количества осадков, тогда как для метеостанции Ростов- на –Дону, наоборот, отмечается тенденция их сокращению (рис. 3).



М Гигант



М Ростов-на-Дону

Рисунок 3. График изменчивости годового количества осадков за 1966-2015 гг.

В целом, о стабильности условий увлажнения данной территории говорят такие показатели как гидротермический коэффициент (ГТК) и коэффициент увлажнения (Ку). ГТК за исследуемый период вырос незначительно - на 0,04-0,08, Ку – практически остался без изменения. Можно сделать вывод о том, что изменения количества осадков не повлияло на условия увлажнения, а значит и на изменение ландшафтных границ (табл. 2,3).

Таблица 2. Изменчивость ГТК за период с 1966 по 2015 гг.

	Гигант	Ростов-на-Дону
Min	0,33	0,33
Max	1,49	1,60
Среднее	0,82	0,88
Норма	0,74	0,84
Разница	0,08	0,04

Таблица 3. Изменчивость Ку за период с 1966 по 2015 гг.

	Гигант	Ростов-на-Дону
Min	0,28	0,34
Max	0,75	1,06
Среднее	0,52	0,61
Норма	0,49	0,61
Разница	0,03	0,00

Анализ опасных агрометеорологических явлений, отмеченных на территории Ростовской области за период с 2010 по 2015 гг. показал, что в большинстве случаев ущерб сельскому хозяйству наносят: чрезвычайная пожароопасность, сильная жара, градобитие, аномально низкая температура. На данные опасные явления приходится 26% от всех опасных агрометеорологических явлений, что говорит об их высокой вероятности возникновения.

Таким образом, на изучаемой территории отмечается рост среднегодовой температуры, особенно на это повлияли месяцы холодного периода. Как следствие увеличилась сумма активных температур и период вегетации на 15-16 дней. Увлажнение территории неравномерно. Количество осадков выросло, однако, для метеостанции Гигант линейный тренд характеризует

тенденцию к увеличению количества осадков, тогда как для метеостанции Ростов- на –Дону, наоборот, отмечается тенденция их сокращению. О стабильности условий увлажнения и ландшафтных границ говорят такие показатели как Ку и ГТК, которые остались практически неизменными. Существенный ущерб сельскому хозяйству наносят такие опасные гидрометеорологические явления, как чрезвычайная пожароопасность, сильная жара, градобитие, аномально низкая температура.

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WATER RESOURCES AND ECOLOGY: MONITORING, POLLUTION AND RESTORATION

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MACROPHYTES GROWTH FEATURES ON THE NORTHCAUCASIAN COAST OF THE BLACK SEA

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Abstract: The article deals with macrophytes growth features on the North Caucasian coast of the Black Sea, in particular the coast of the Tuapkhat massif. The features were identified in accordance with predominate species and growing conditions.

Key words: macrophytes, the Black Sea, coast features, the Tuapkhat massif, growth features, beach, shoreline.

This study was conducted in the period from the end of May till the end of June 2017 and coordinated by the Southern Branch of the P.P. Shirshov Institute of Oceanology.

The object of the research is the Tuapkhat massif – a part of the coast between Kabardinka and Gelendzhik (Krasnodar Region, Russia). The study covered the area from Golubaja Buhta (Gelendzhik District) to the 5th Pine gap.

The massif is a low ridge. The maximum height is 434 m and its area is about 30 square kilometers. It is strongly dissected by the valleys of streams. The seacoast is an erosion scarp up to 100 meters high, decreasing only at the mouths of streams [1]. According to the geological maps of Krasnodar Region, this massif is formed with the rocks of the Cretaceous period, such as limestones, marls, sandstones and argillites. At the erosion scarp there is an intercalation of sandstones and marls, there are also quartz reefs [2].

The goal of the study was to identify the features of the growth of macrophytobenthos of the Black Sea North-Caucasian coast on the

research area of the Tuapkhat massif. These features include: topography of the beachside terrain, conformation of continental slope, wave mode and the predominant macrophytes. In accordance with the goal of the study, we identified the specific composition of macrophytes, found their communities and made a scheme of macrophytes distribution.

The specific composition is presented by most common species: *Enteromorpha intestinalis*; *Cystoseira barbata*; *Dilophus fasciola*; *Padina pavonia*; *Ulva lactuca*; *Ectocarpus siliculosus*; *Laurencia obtusa*. Then seven communities of macrophytes were identified. The research was conducted at a depth of approximately 2 meters and about 30 meters from the shoreline. The communities were marked according to the predominate species and their growth conditions:

1. Community of *Cystoseira*:
 - 1.1. It grows as a solid cover;
 - 1.2. It is a mosaic community;
 - 1.3. It grows on the bench;
2. Community of *Dilophus*;
3. Community of *Enteromorpha*;
4. Community of *Cystoseira* with an epiphyte *Ectocarpus*;
5. Multi-species community using blocks (from 20 cm) as an understratum.

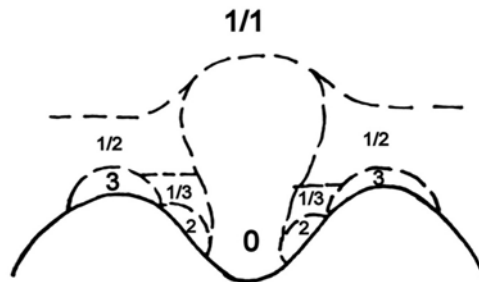


Diagram 1. General view of the distribution of macrophytes communities (0 – macrophytes absent; 1/1 – *Cystoseira* grows as a solid cover; 1/2 – *Cystoseira* grows by ridges on the bench; 1/3 – *Cystoseira*

grows mosaic; 2 – Community of Dilophus; 3 – Community of Enteromorpha)

Thus, we can make some general conclusions about the macrophytes growth features along the coast of the Tuapkhat massif. Macrophytes need a substrate to grow on. In the bends of the shoreline the understratum is not suitable for growing (small bench gravel), there is also a strong wave effect which does not allow macrophytes to grow there. So there are no macrophytes in these places or they are represented by rare individuals at some distance from the shoreline (Diagram 1, point 0). At the capes macrophytes grow by ridges mainly using the bench as an understratum (Diagram 1, point 1/2). Also, there are communities of Enteromorpha near the shoreline (Diagram 1, point 3). Along the areas from the capes to the bends of the shoreline or on the shallow water, macrophytes usually grow mosaic and sometimes at a distance of over 1 metre from each other (Diagram 1, point 1/3). Usually there are communities of Dilophus and Padina near the shoreline (Diagram 1, point 2). Multi-species communities which use blocks as an understratum were found twice on the site of landslides. Communities of Cystoseira with an epiphyte Ectocarpus mainly grow on the shallow water. But everywhere, at a distance of approximately 20 meters, macrophytes grow as a solid cover (Diagram 1, point 1/1), with Cystoseira barbata dominanting there.

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**ABRASION AS A PROCESS OF FORMING THE KARADAG'S
COASTLINE**

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Abstract: The study of relief-forming processes of coastal zones in the Karadag Nature Reserve is an important part of the scientific activity of the reserve. Researches in this direction make possible to study not only the geoenvironmental features of a collapsing object, but also many practical things that can affect a human's life.

Key words: Karadag reserve, abrasion, relief, coastline, geoenvironmental research.

The study of relief-forming processes of coastal zones in the Karadag Nature Reserve is an important part of the scientific activity of the reserve. Researches in this direction make possible to study not only the geoenvironmental features of a collapsing object, but also many practical things that can affect human life.

Karadag is a separate mountain massif between the Otuzka's valley and the vast Koktebel basin on the Black Sea coast. Its main elements are the Coastal Range, which stretches along the coast, and the dome-shaped array of the Holy Mountain inside of the land. [1]

The whole territory of the reserve is an ancient geological fragment of the extinct volcano of the Jurassic period, which is named Kara-Dag (130-150 million years ago). The volcanic massif holds over traces of lava formation and weathering. [2]

The Karadag mountain group is located almost 45 ° N, therefore it is located near the northern boundary of the subtropical zone of the northern hemisphere. The reserve area belongs to the south-eastern climatic region, which is characterized as very arid, hot, with a very mild winter. [3]. The relief of Karadag is characterized by a complex mosaic of surfaces with different angles of slope. The background angles of slope are 10 - 20 °. [4]

Studying of the dynamic of the coastline is of great practical importance. Detailed studying the morphology of the coastline helps you learn the history of its development, the features of the seabed and the speed of coastline abrasion. A different speed of abrasion leads to the formation of bays, as a result of which the coast is dismembered.

Studying of the destruction and dynamic of the coast must be considered, for example, in hydrotechnical construction, in the creation of recreational facilities (resorts), and in the development of building materials in the coastal zone (pebble, sand and shell sediments).

The length of the Karadag's coastline, within the reserve, is about 8 km. On this stretch the coast is abrasion. Its configuration depends on the geological and structural conditions and the anti-destruction resistance of rocks. The convex arc of the Karadag's coast is complicated by the embedded bays and the capes that separate them, which, in combination with the precipices, makes the coast especially picturesque.

The bays are worked out both in submissive and very pliable rocks (bays: Karadagskaya, Pascha, Lyagushach'ya, etc.), and in medium-resistant and persistent rocks (bays: Razboynichya, L'vinaya, Serdolikovaya, etc.). The capes are built by very persistent rocks of the prepared intrusions (the rocks: Ivan Razboynik, Lev, Mayak, Slon, the capes: Tupoy and Ploychatyi) or are formed in submissive and very pliable rocks, take on and extinguish the force of the storm waves (capes: Malchin, Kokushkin, etc.). The depth of the cutting of the bays into the coastal arc of the abrasion coast does not usually exceed 100 m and reaches a maximum of 200 m in the bay of L'vinaya.

Also on the coast of Karadag the following forms of relief of marine origin are noticed: cliffs, wave-surfacing niches, abrasion caves, remains and beaches. [4]

All relief-forming processes of the coastline are connected with the action of the sea. The Black Sea is one of the most peculiar sea basins of our planet and belongs to the Atlantic Ocean basin. [3] Part of the territory of the Karadag Nature Reserve in 2004 received international status. "Aqua-rock complex of Karadag" and it was included in the list of wetlands of international importance (Ramsar Convention). [6]

Thus, studying of relief-forming processes of coastal zones both in the Karadag Reserve and elsewhere is a very important work of scientists. For example, to solve the problems of coastal dynamics, the method of material distribution by size (granulometric analysis) is used. We carried out a study of the granulometric composition at 7 points of the coast. Below there is a graph of the granulometric composition of rocks in the rocky fraction in the bay at Kuzmichev stone (Figure 1).

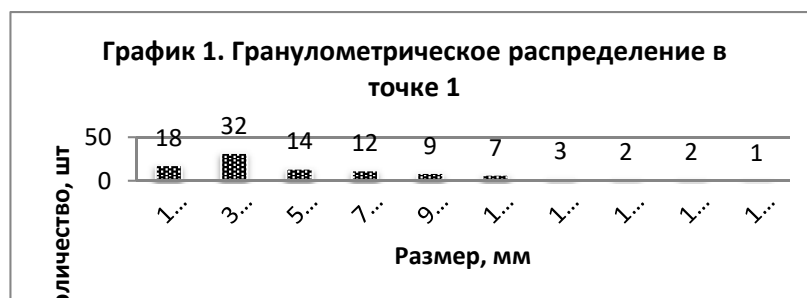


Fig.1 The granulometric composition of the rocky fraction at point 1.

Research in this direction allows us to study not only the geological features of a collapsing object, but also many practical things that can affect a person's life. For example, abrasion can threaten the safety of residents of coastal cities and in this case it is necessary to develop measures on the basis of research to protect against this process.

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**METHODS OF DRINKING WATER DISINFECTION:
CHLORINATION AND OZONATION**

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Abstract: Drinking water is a precious resource for mankind. Nowadays there many methods of water disinfection have been developed. However, the methods of chlorination and ozonation are the most popular at the moment.

Key words: chlorination, ozonation, disinfection, drinking water, monochloramine, dichloramine, oxidizing ability.

Nowadays anthropogenic water pollution is a global problem. The available technological equipment does not cope with this heavy load because it is outdated. At the moment there are many technologies for water purification, however, the quality of drinking water is deteriorating (according to various indicators, including bacteriological). From the high content in water pathogens It is difficult to eliminate a high content of water pathogens. Many disinfection methods are low-sensitive to them.

Disinfection is a process which results in the destruction of pathogenic organisms in water. In Russia the leading method of disinfection is chlorination, where chlorine gas and its derivatives are used. One of the alternative methods is ozonation.

The method of the chlorination of water is based on the ability of free chlorine and its compounds to inhibit the enzyme systems of microbes. In the first stage, chlorine enters water and hydrochloric and hypochlorous acids are formed. Further there is a dissociation reaction, which produces hypochlorite ion [1].

The ClO and HOCl molecules have chemical activity and bactericidal action. Free active chlorine is the sum of HOCl, Cl₂, and ClO. In most cases active chlorine first reacts with nitrogen-containing compounds and then with organic compounds. Herewith monochloramine (NH₂Cl) and dichloramine (NaHCl₂) are formed. Gaseous chlorine is used more often than liquefied chlorine. The chlorination process can be either one-staged or two- staged. It depends on the quality of water supplied for disinfection. Water with a high

content of organic matter and microorganisms goes through chlorination twice.

The advantages of chlorination are: high efficiency of disinfection; water retains antibacterial properties; removal of unpleasant taste and odor, prevention of algae growth and filter biofouling; destruction of organic compounds; chlorination is effective against most pathogens. The disadvantages of the method are: 300 toxic compounds are applied; it causes mutations, allergic reactions, corrosion of equipment; it is necessary to enforce strict safety measures when people work with chlorine and chlorine-containing compounds [2]

Ozonation is a chemical water treatment technique based on the infusion of ozone into water. Ozone is a powerful oxidant that destroys most bacteria and viruses. During the process of ozonation the taste of water improves.

Ozone is a gas of blue or light purple color, which spontaneously decays into oxygen in the air and in aqueous solutions. Ozone has very high oxidizing ability. It is due to an easy recoil of one atom of oxygen.

There are two ways to generate ozone: physical (during an electrical discharge) and chemical (a result of UV radiation). In the laboratory ozone can be obtained by interaction of cooled concentrated sulphuric acid with the peroxide of barium.

There are two processes (oxidation and disinfection) when oxygen contacts with ozone in water. There are four types of oxidation: direct, indirect, ozonolysis and catalysis. The reaction of direct oxidation: $\text{matter} + \text{O}_3 \rightarrow \text{oxidised substances}$. A number of organic and non-organic substances oxidize and then precipitate in the form of insoluble hydroxide or convert into permanganate and dioxins and are removed on the filters. The process of indirect oxidation is due to a large number of free radicals which are formed as a result of ozone transition from gas to liquid or during the process of spontaneous decomposition. It is used in the purification of water from phenols, petroleum products, dyes, heavy metal ions, organic solvents [3].

It is more preferable to use ozone rather than chlorine when substances react with chlorine forming toxic substances or impairing the organoleptic properties.

The advantages of the ozonation are: high biocidal activity; ozone destroys organic matter; ozone effectively oxidizes metal

compounds; mineral composition and pH of the water remain unchanged; due to ozone the basic organoleptic properties are improved; ozone does not form carcinogenic compounds and destroys microorganisms faster than any other disinfectant. Disadvantages of the method are: ozone is unable to maintain bactericidal condition of water for a long action; ozone is a toxic gas; water becomes corrosive; the concentration of "assimilated organic carbon" increases contributing to the activity of microorganisms [2].

To sum up, both methods are strong disinfectants, however, ozonation provides a higher degree of disinfection. The use of ozone is effective against viruses; it is not true for chlorine. The effect of chlorination is longer than the effect of ozonation.

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Gvozdeva E.V.
**REPORT ON THE RESULTS OF PRACTICE IN THE
SCIENTIFIC RESEARCH INSTITUTE "HYDROPROJECT".
THE IMPACT OF THE UGLICH, RYBINSK,
ZHIGULEVSK AND UST-DZHEGUTINSK HYDROPOWER
PLANTS ON THE ECOLOGICAL CONDITION OF
ENVIRONMENTAL COMPONENTS**

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Abstract: The article considers the results of the scientific research pre-diploma practice held in the design and research institute "Hydroproject" named after S.Y. Zhuk. The purpose of the practice was systematizing and processing the data on water composition in the reservoirs of the Uglich, Rybinsk, Zhigulevsk and Ust-Dzhegutinskaya hydroelectric power stations.

Key words: water composition, a reservoir, the Uglich, Rybinsk, Zhigulevsk and Ust-Dzhegutinskaya hydroelectric power stations, engineering survey.

The Scientific research pre-diploma practice was held in the design and research institute "Hydroproject" named after S.Y. Zhuk. The Institute "Hydroproject" is one of the oldest organizations designing hydropower facilities. The organization views the management of environmental efficiency as one of the main conditions for guaranteeing the safety and reliability of designed objects.

The purpose of the practice was systematizing and processing the data on water composition in the reservoirs of the Uglich, Rybinsk, Zhigulevsk and Ust-Dzhegutinskaya hydroelectric power stations in accordance with the current project objectives of the Institute "Hydroproject". To solve the tasks, the following studies were carried out: working with the data on the Uglich, Rybinsk, Ust-Dzhegutinskaya hydropowers; analysing literature data (journal "Ecology of industry"; studying computer programs (AutoCad, Surpher, GoogleEarth); data processing, charting and diagramming; analysing surface water monitoring; studying the laws and regulations in the section of surface water MPC (maximum permissible concentration).

A hydroelectric power plant is an enterprise of the fuel and energy complex, whose main activity is generating electricity.

The Uglich, Rybinsk and Zhigulevskaya hydroelectric power stations are part of the Volga-Kama cascade of hydropower plants (HPP).

The Uglich hydroelectric power station is located in the town of Uglich, Yaroslavl Region. Structurally, the Uglich facility is a low-pressure channel hydroelectric power station (the HPP building is part of the pressure front).

Rybinskaya HPP is located in the city of Rybinsk, Yaroslavl Region. It is also a low-pressure channel hydroelectric power station (the building of the hydro power station is part of the pressure front).

The Zhigulevsk hydroelectric power station is located on the territory of the city of Zhigulevsk. The Zhigulyovskaya Hydroelectric Station is classified as a low-pressure channel hydroelectric power station of the run-of-river type.

While studying the water composition of Uglich, Rybinsk and Zhigulevskaya HPPs, the components which determine the surface water contamination rate were analyzed.

The working wheels of some turbines currently working at the hydroelectric power station are a potential source of running water contamination. In accordance with the work technological regulations, turbine oil leaks can occur from the turbine control system. They are a source of oil products entering the lower tail of the hydrosystem. Other pollution does not enter the water. Under normal operating conditions, technological leakages through seals amount to 11 tons per year.

Special attention was paid to the construction of the Ust-Dzhegutinskaya small hydropower plant (SHPP)

Ust-Dzhegutinskaya SHPP is located in the southern outskirts of Ust-Dzhegut under the dam of the main (Golovnoi) reservoir on the river Kuban.

In 2012, the project was included in the investment program of PJSC "RusHydro", at the end of 2013, a contract was signed for a new design.

The small hydropower plant is attached to the existing dam on the Great Stavropol Canal at the Ust-Dzhegutinsky reservoir. The main criterion for the construction of the SHP was to use the potential of the idle discharge, which is currently dumed into the River Kuban through the existing spillway.

During the practice the author participated in making a technical report on the results of engineering surveys for developing project documentation on the construction of the Ust-Dzhegutinskaya small hydroelectric power plant.

In the reports, the following indicators were analyzed:

- chemical composition of soils, sediments, groundwater and surface water.

- sanitary-parasitological and microbiological studies of soils

- microbiological testing of surface waters

- measurements of radiation levels.

The results of processing the obtained data and their comparison with the current regulatory documents showed that the chemical composition of bottom deposits and underground water does not exceed the MPC values and comply with the requirements of SanPiN.

The chemical analysis of soils revealed that the concentration of the substances under study does not exceed the maximum permissible content in the soil, with the exception of ammonium nitrogen.

The main sources of ammonium ions entering the soil are livestock farms, domestic sewage, and surface runoff from farmland.

Sanitary-parasitological and microbiological studies of soil did not reveal any excess of permissible values either.

However, according to the results of the research, the exceedance of the permissible values for Coliform bacteria and thermotolerant bacteria was revealed in water samples selected in the upper and lower reaches of the reservoir on the River Kuban.

The radiation situation does not exceed the norm.

Thus, on the basis of the materials obtained during the research practice at the Institute "Hydroproject" it is planned to write a master's thesis on the topic: "Evaluation of the geoecological conditions of the Ust-Dzhegutinskaya HPP area for the development of design documentation of the construction".

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**ANALYSIS OF THE POLLUTION DEGREE ASSESSMENT
METHODS FOR BOTTOM SEDIMENTS**

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Abstract: This article provides a brief analysis of existing methods of pollutant content estimation of the bottom sediments and their shortcomings.

Key words: bottom sediments, heavy metal, pollutants, water pollution, rivers, water bodies, pollution degree assessment.

Bottom sediments are a depositon for various pollutants. Based on this fact it is possible to characterize the state of the entire ecosystem and the types of facilities situated in the nearby territory.

The rates and volumes of formation of bottom sediments and their level of contamination are different throughout the existence of the water body [1]. It is possible to trace the changing anthropogenic impact on water ecosystems over time and changes in natural processes.

Therefore, depending on how effective the monitoring system of the state is, bottom sediments are used to estimate the level of anthropogenic impact on river ecosystems.

The need of rationing of pollutant content in the bottom sediments is due to the fact that heavily contaminated bottom sediments have a serious negative effect on the water quality. However, in Russia there are no standards for bottom sediments. Therefore, different methods of evaluation are used for monitoring. They can be divided into two groups: biological and physicochemical.

It is quite common to use biological methods to control the quality of water bodies [2], but their use is limited by numerous requirements for test objects. Besides, test objects are strongly influenced by factors unrelated to pollution such as pH, oxygen content,

temperature, salinity, etc.

Many methods based on physical and chemical analysis suggest the use of background concentrations. For example, L. Hokanson [3] suggested a calculation of integrated indicators characterizing the complex pollution of bottom sediments. It is based on the calculation of the pollution factor (C_f) for each pollutant by dividing the detected concentration by the "pre-industrial" background concentration. Calculation should be for the main types of pollutants: Ni, Co, Cu, Zn, Cd, Pb, Cr, As, Hg. The pollution degree is determined by the sum of all pollution factors for a given territory.

Table 1. Classification of the contamination degree of bottom sediments by L. Hokanson

Contamination degree C_f	Evaluation
$C_f < 10$	low
$10 < C_f < 20$	moderate
$20 < C_f < 40$	significant
$C_f > 40$	high

According to some methods the Clarke value of rocks or soil [4], geochemical background [5], regional soil background, concentrations of pollutants in sediments selected upstream relative to the study area [6] are used as background.

A significant drawback of the methods of this type is the inability to obtain a reliable background concentration value due to widespread technogenic influence on water bodies.

Another frequently used approach is assessment of the bottom sediments quality based on techniques developed for soils. In contrast to bottom sediments, there are pollution standards, maximum permissible concentrations and approximate permissible concentrations for soils [7,8]. In addition, as a rule, there is data on regional pollution background for soils. However, the use of soil assessment methods for bottom sediments is insufficiently correct in relation to the difference in genesis and ways of transformation from sediments.

Analysis of methods for assessing the contamination of bottom sediments shows the lack of unified approaches. This makes it difficult to create a unified system of standards.

In this regard, one of the most urgent tasks in the field of environmental regulation is the search for approaches to establishing standards for the quality of bottom sediments.

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THE DYNAMICS OF EROSION PROCESSES AND THE MAIN FACTORS OF THEIR DEVELOPMENT IN THE SKHODNYA BASIN WITHIN THE LIMITS OF MOSCOW FROM 2012 TO 2016

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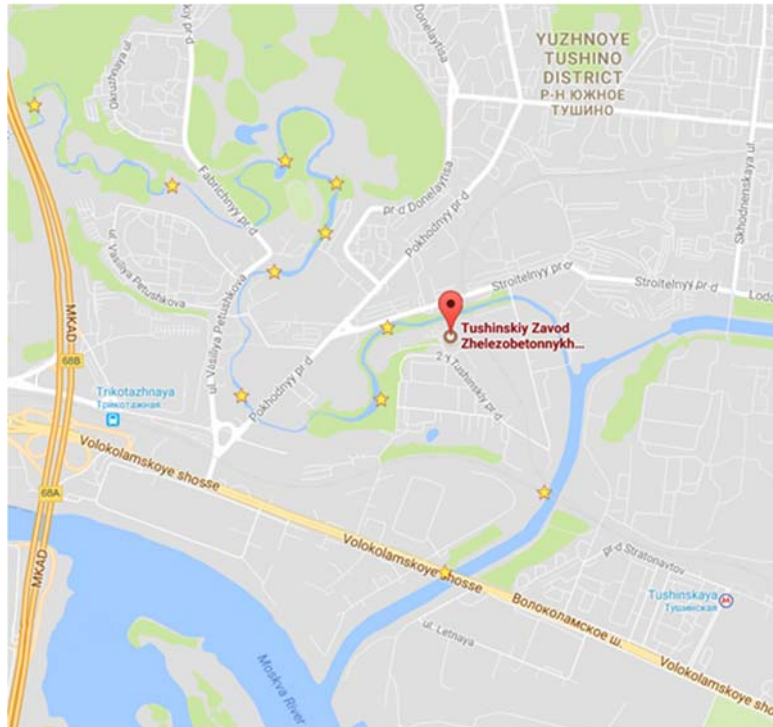
Abstract: The work examines the main theoretical and practical issues related to the processes occurring in the river beds and floodplains. The main attention is given to obtaining an objective assessment of the state of the banks of the Shodnya River.

Key words: erosion, underwashing of vegetation, collapse, lateral erosion, ruderal species.

Introduction. Water bodies of Moscow are a single network that performs a number of city-forming, engineering and environmental functions [1]. In Moscow, there are more than 140 rivers, one of the largest of which is the Skhodnya. Today the river valleys are transformed, prone to landslides and eroded, littered.

Methodology. The object of the study was the river stretch from the Moscow Ring Road to flow into the Moscow River. The length of the site is 18.6 km.

Eleven points were chosen on this river stretch (fig. 1). The first six points are in the zone of Special Protected Natural Areas. There is often accumulation of domestic garbage here; there is a tendency of destruction and damage of vegetation by trampling. The industrial zone is located starting from the 7th point in the water protection zone and in the adjacent territory. Significant accumulations of domestic garbage and construction debris were seen on the banks of the Skhodnya River [4].



The figure 1. The point map

The survey revealed the following attributes of erosion:

1. In 2013 the underwashing of vegetation is expressed clearly at the bridge crossing near Vasily Petushkov street.

In subsequent years, the situation is aggravated in view of narrowing of the wetted section by the supports of the bridge. And a local zone of erosion is formed due to the decrease of the width of the river at the site.

2. There is a process of collapse of the car cover in the Skhodnya close to Donelaitis driveway.

The photographs show that attempts have been made to strengthen the coast with a curb, stones, a fence, iron nets. Still, the destruction continues in 2016.

3. The formation of local zones of weak washout downstream is typical for the banks around the extreme point.

Since 2012, there have been no obvious changes in the zone of the description of this point.

In general, erosion processes are weakly expressed in the area of the river under investigation, and in places the river carries out lateral erosion. However, the erosion of the banks in some areas is quite intensive, take the territory around the third point, which belongs to the "Shodnenskaya Chasha" park. This area of the river is characterized by a well-defined meander, which causes the presence of areas that are eroded particularly quickly.

Small rivers react to human economic activity. This is due to the change in the landscape character of the catchment area [3].

Vegetation has a direct effect on erosion [2]. Ruderal communities are more common along the river. The presence of ruderal species in the community always speaks of the disturbance of phytocenosis.

Ruderal species due to very weakly expressed connections with other components of phytocenosis are not able to keep the riverside and slopes of valleys in a stable state. Therefore, the introduction of ruderal species is the most unfavorable for the aboriginal ecosystems of the river valley.

Results and conclusion

The observations in 2016 showed that erosion processes are poorly expressed in the lower reaches of the Skhodnya River. However, in places the river carries out lateral erosion which leads to rather intense washout at coasts at its individual portions.

Comparison of photos of the coasts from 2012-2016 showed that, overall, the pace and direction of geomorphological processes in the surveyed sections of the Skhodnya River remain stable.

In the period from 2012 to 2016, the tendency of deterioration of the coastal vegetation from the upper reaches to the lower reaches of the river is pronounced, which indicates a strong anthropogenic impact on coastal ecosystems.

In conclusion River erosion is an indicator of the activity of the river. The intensity of erosion is related to a number of factors: the amount of precipitation and the features of their fallout, the size and flow of the river, the topography, the nature of the vegetation cover and the soil. The water protection zone of the Skhodnya River needs further landscape planning and protection of the lateral erosion, including in areas of unregulated development. Also, biological reclamation and

planting of vegetation should be carried out to prevent the rate of destruction of the banks.

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**WATER RESOURCES AND ECOLOGY. MONITORING
POLLUTION AND RESTORATION. NIGERIA AS A CASE
STUDY**

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Abstract: Water resources in Nigeria are becoming scarce on a daily basis as it shares multifunctional purposes such as irrigation, hydropower, water supply, fisheries, eco-tourism. Monitoring water resources, clean, drinkable and portable for the purpose of its intention, is based on measuring impacts and ensuring restoration. The present study focuses on improving understanding of water footprint, managing risks, and operation activities centered on water consumption through the use of non-fresh water sources, reusing and recycling produced water. This paper cross-examines the current situation and proposes sustainable application of caution using environmental impact assessment as a tool to expose areas of concern and analyze benefits and actions in handling water resource, ecological degradation, and suggests an efficient system of pollution monitoring.

Key words: water resources, pollution, monitoring, EIA, restoration, matrix structure and P4s.

An important issue is a poor improvement of water quality before discharging. Ecological activities have exponentially, de-valued the support for sustainable development drives due to depletion of land, forest, an entire ecosystem, and negatively affects the biosphere especially in Niger Delta [1]. Nigeria is drained mainly by Rivers of Niger and Benue with numerous tributaries that also linked to the Lake Chad basin. The total surface and groundwater resources are estimated at above 250 Billion cubic meters. But water bodies in Nigeria continues to witness unabated defacing of industrial oil spillage and gas flaring. Presently, 31% (52.7million) of Nigerians, mostly in the Rural Areas, are still without access to improved drinking water sources. Access to sanitation is on the decline with an increase in open defecation and poor management and installment of public toilets in the market or public places. A recent study in the region by Ordinioha [2] showed that (37.9 %) of most common sources of drinking water was from surface water, (61.2%) from drawers and there were an average of 17 communities in Niger Delta with water supply facilities, but only (23.8%) of the facilities were functional. More than two third (67.9%) tested samples were found to contain significant numbers of Escherichia coli. Domestic solid waste generation creates important sources of groundwater pollution when they are disposed on streets where high rainfall and shallow water table occur. Such refuse dumps accumulate in leachates includes chlorides, manganese, nitrate, and iron [3].

Environmental pollution resulting from the activities of oil industries have an immense contribution to local water consumption in Nigeria or any industrial outlets [4] as well as the organic pollution sourcing from food-processing and packaging companies.

We consider the following objectives for the study:

1. To identify sources of water pollution in Nigeria
2. To analyze the impact of pollution on the environment in Nigeria.
3. To determine and foster solutions through monitoring and restoration.

A simple approach to internalizing standards, best practice, guidelines, procedures, and tools that expose and present key operational steps from exploration to decomposing was explored. Using a descriptive cross-sectional design analysis method to assess the

environmental Impact, benefits, and actions on water resources and its ecological issues. The approach covers sustainability with an integrating technology and engineering resulting from the process of improvement and innovating strategies.

Recommendation and Solutions. There surely cannot be any radical solution. However, the following attempts can be made to solve the problem of environmental pollution of the water bodies and ecology:

- The Government can at least see that future factories are set up at a distant place, an industrial complex far away from the township and ensure the wastewater are properly disposed.
- Forestry should be developed to accommodate fresh air.
- Discharge of Factory wastes in rivers should be banned.
- Recycle the sewage or dispose it in such a way as to prevent it from polluting the environment.
- Reusing and repairing items wherever possible, and recycling as much as we can.
- Organic farming.
- States and local governments should adopt frequent monitoring and supervision in prone areas.
- Some cultural rituals done in the riverine areas that pollutes water bodies should be banned and abolish.
- Local communities should be educated on the importance of water hygiene.
- Basic infrastructure development such as hospitals, access to potable water etc. should be provided to the people among others.

Conclusion. Environmental pollution, causes, effects, and solutions are priority areas for sustainable water resources especially for developing Nations like West African communities and Nigeria in particular, its economic growth, and well-being. Managing limited fresh water should be a key priority for business merchants in Nigeria as its future availability is rapidly changing. Adequate and critical attention should be given to the water bodies and its sources. Because water shortage or/and unavailability contribute over 90% of preventable water-borne diseases, and deaths in the Economic of West African States (ECOWAS) region and Nigeria in particular due to the presence of unhealthy sources, dirty canals, gutters or slumps that enhances mosquito breeding round the year in a dense population.

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COMPARATIVE ANALYSIS OF MORPHOMETRIC CHARACTERISTICS OF THE BIG RIVERS OF THE VORONA RIVER BASIN

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Abstract: The article considers the morphological structure of the basin of large tributaries of the Vorona river. In particular, the distribution of these morphometric characteristics of the basin as the length of waterway and basins area of the large inflows of the Vorona river to the third range inclusive is considered.

Key words: the Don basin, tributaries, morphometric characteristics, length of the waterway, catchment area, the Vorona River.

With the development of human civilization, the issues of safety of human existence in technosphere are becoming increasingly important. The issues of human economic activity and the safety of construction of water-dependent facilities also require knowledge of the sources of water entering it, the quality of the water flowing in particular tributaries [1] and its hydrochemical indicators [2], not only of the river waters of the adjacent waterway.

The length of the river and the area of the river basin are the main morphometric characteristics [3].

The study of the hydrographic network and the structure of river basins is of considerable importance.

Horton R. proposed the following system for the analysis of river basins: the definition of ranges of a river network and the study of its structure. Rychagov G.I. was engaged in a thorough research of the hydrographic network and catchment basins [4]. Shmykov V.I. examined the structure and function of river basins and notes that the hierarchy of the river network belongs to an important place in the structure of the basin [5].

The Vorona River - is a right tributary of the Khopyor River (the Don River) and a typical lowland river. The river rises in Kerensko-Chembarskaya Highland in the Penza region, flows through the Tambov region and the Voronezh region. It is 494 kilometers long, with a watershed of 13.200 square kilometers.

We studied the largest first-range tributaries of the Vorona River with a watershed of more than 500 square kilometers. The subject of the study was the distribution of smaller tributaries to the third range in the six rivers of the Vorona basin: Chembar, Ira, Vejlya, Karai, Mokraya Panda and Bogana.

We examined such parameters as the length of the waterway and the catchment area. Basins of all tributaries of the Vorona River to the third range were appointed inclusive. When tributaries and basins of tributaries of the first, second and third ranges relating to the basins of the studied waterways were drawn using the CorelDRAW X3. Further, the lengths and basins areas of all tributaries to the third range that interested us were measured.

The results of measurements of the lengths of waterways and catchment areas are shown in Figures 1-2.

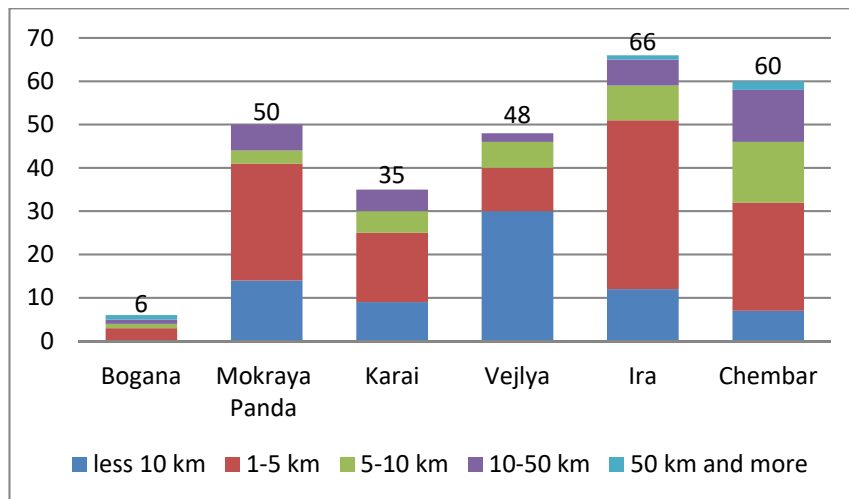


Fig. 1 The distribution of tributaries of the six main rivers of the Vorona basin along the length of the waterway

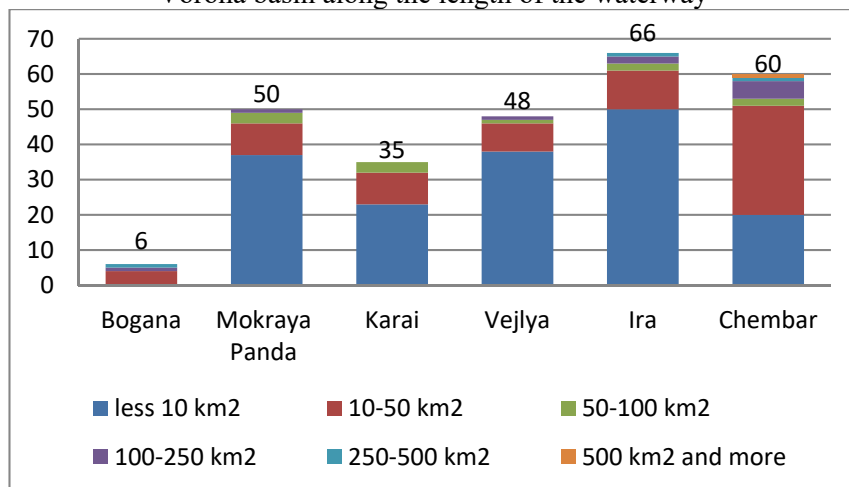


Fig. 2 The distribution of tributaries of the six main rivers of the Vorona basin by catchment area

As shown in Fig. 1, considerable part of the tributaries to the third range of the investigated rivers are tributaries with a length of 1 to 5 km.

The next most numerous are tributaries with a length less than 1 km, then waterways from 5 to 10 km in length. The smallest group of rivers are tributaries with a length of more than 50 km: two waterways of this category are found in the basin of the river Chembar (the Bolshoy Chembar, the Macha), one waterways in the Ira basin (the Irka) and one in the Bogana basin (the Baklusha).

Analyzing picture 2, we can note that about half of the tributaries of the Cembar, Ira, Viazlya, Karay, Mokraya Panda and Bogana rivers have a catchment area of less than 10 square kilometers. A group of tributaries with a catchment area of 10 to 50 square kilometers is also numerous. In comparison with them a small group consists of rivers with an area of 50-100 square kilometers and 100-250 square kilometers. Waterways with a catchment area from 250 to 500 square kilometers are in the rivers Bogana, Ira and Chembar. Tributaries with an area of more than 500 square kilometers are absent in all rivers, exception is the river Chembar (the Bolshoy Chembar).

The results of the work lead us to the following conclusions. Besides tributaries of the first range as the Chambar, Ira, Viazlya, Karay, Mokraya Panda and Bogana, the largest tributaries are waterways of the second range such as the rivers Bolshoy Chembar, Macha, Irka and Baklusha. The tributaries of the Vorona River within the reserched rivers have a small waterway length and exceed 50 km rarely. Most of the tributaries have a length of less than 5 km. The areas of river basin of the tributaries of the Vorona River have an average catchment area mainly and exceed 250 square kilometers rarely.

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SOIL CONTAMINATION AND LANDSCAPE RESEARCH

Galikbarova R.M.

ASSESSMENT OF THE EXTENT OF POLLUTION BY GEOCHEMICAL RISK ZONING, MEASURES TO ELIMINATE OR REDUCE THE RISK

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Abstract: There is a concept of geochemical risk, which must be taken into account to reduce or prevent further environmental pollution, to provide the population with favorable conditions and for rational use of the city territory in the design and implementation of works on the development of underground space in megacities.

Zoning of the territory of the city by geochemical risk allows to assess the extent of environmental pollution at various sites of construction of underground facilities. Geochemical risk in urban underground construction is ranked according to the state of the soil cover and ground contamination at all stages of the life cycle of the underground facility in according with the categories.

Measures to reduce or eliminate the source of pollution are proposed.

Key words: geochemical risk, geosystem, rock mass, monitoring, criteria.

Introduction. Today in meetropolis there is an active development of underground construction, while technological operations introduce a harmful chemical component into the environment. In this way, the prerequisites for the development of geochemical risk are created. To minimize the further pollution of the natural environment, to protect the population from adverse environmental consequences, rational use of the city territory in the design and implementation of works on the development of underground space in large cities, this type of risk of the territories is necessary.

Geochemical risk is estimated by possible losses as a result of accumulation of harmful pollutants in depositing environment: soil cover, bottom sediments, snow, which is accompanied by a decrease in environmental reliability of elements of the natural and technical

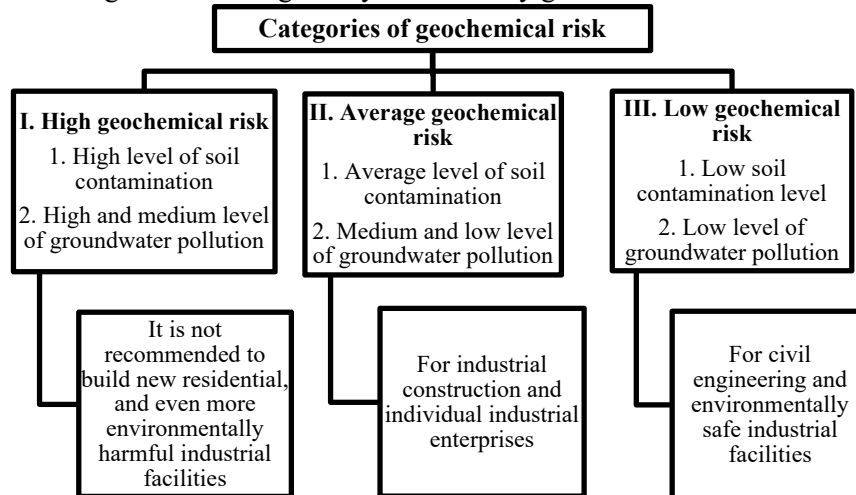
geosystem "rock mass - technology - underground construction - environment" and urban environment in general.

Underestimation of the dynamics of natural processes in underground construction can lead to accidents causing geochemical risk in the area of construction of an underground facility.

Analysis of the condition of sewerage and treatment facilities over the past 5 years shows that in many cities both sewage and treatment facilities are unsatisfactory and continue to discharge polluted sewage into water bodies, posing a threat to public health [3,4]. Therefore, the number of discharges of industrial and domestic water has significantly increased. In addition to the quantitative change in wastewater, a qualitative change has occurred, which is most often manifested in the intensification of the aggressive properties of the environment.

The Institute of Geoecology of the Russian Academy of Sciences on the basis of two processes: contamination of soil cover and groundwater contamination compiled a map of geochemical risk in Moscow [2]. The geochemical risk map was based on the zoning of the territory according to risk categories, which were distinguished by a combination of soil and groundwater contamination levels (Fig. 1). The level of pollution of groundwater was conventionally determined based on soil contamination and groundwater protection.

Figure 1. Ranking of city territories by geochemical risk



Based on the accepted classification of categories of geochemical risk, it is recommended to carry out measures to eliminate pollution sources or reduce their impact [1]:

1. The withdrawal of environmentally harmful industrial enterprises, and in case of impossibility of withdrawal - the reconstruction of enterprises by introducing new technologies or improving local treatment facilities; compliance with strict control over emissions and discharges of harmful substances;
2. Reduction of emissions from motor vehicles (introduction of special types of fuel and electric transport), landscaping of areas adjacent to highways, construction sites, planting dust, gas-resistant green spaces;
3. Liquidation of unauthorized landfills.

The development of environmental measures, the justified choice and effectiveness of which are determined by the quality and completeness of information characterizing both the natural environment and the man-made load in the city, should be based on the results of comprehensive monitoring of the state of the environment and public health [5].

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**HERBAGE PLANTS AS BIOINDICATORS OF RADIOACTIVE
CONTAMINATION**

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Abstract: the important part of evaluation of radioactive contamination of a territory is the analysis of bioindicators among herbage plant, because plants retain up to 45% of radioactive fallouts.

Key words: bioindicators, radioactive contamination.

After the Chernobyl accident some territories of Russia, Ukraine and Belorus were exposure to radioactive contamination. 14 regions in the Russia were contaminated (Bryansk, Belgorod, Voronezh, Kaluga, Kursk, Lipetsk, Leningrad, Orel, Ryazan, Tambov, Tula, Penza, Smolensk, Ulyanovsk regions) and Mordovia. In these territories were formed contaminated areas of Cs-137, with a level above 1 Ci / km². The total area of contaminated territories was almost 55100 km² [1]. Research of the territories showed that in the long term the radiation hazard is associated with the presence of long-lived radionuclides: Cs-137, Sr-90 and Pu-239.

The reliable bioindicators of radioactive contamination of the territory are herbage plants. In the initial period of the Chernobyl accident (the first 15 years after contamination) a natural plant stand were retaining 30-45% of radionuclides and 30% of Cs-137 and perennial sown grasses were retaining 20-40% and 7-15% respectively.

The input of radionuclides in plants happened in two ways. Aerial way of contamination happened when radionuclides settle down on the herb. Soil way of contamination happened when the roots of plants extract radionuclides from the soil solution [2].

The intensity of absorption of radionuclides by plants depends on their biological specifics. The dependence in the accumulation of Cs-137 and Sr-90 and their chemical analogs is observed. The main

carrier of Cs-137 in biological chain is its analogue – potassium, and of Sr-90 - calcium. Plants, which contain more calcium accumulate more Sr-90, and plants, which contain more potassium accumulate more Cs-137 [1].

For example, some authors [3] say about plants-bioindicators of Sr-90: leguminous crops (pea, vetch) and leguminous crops (clover), root crops and tuber crops (beet and potato), and grain varieties (oat, wheat and lint).

Plants-bioindicators of Cs-137 are: May lily, bracken, two-leaved bead-ruby, roebuck berry, rain varieties, Solomon's seal and mountain parsley.

Despite the touch between species of herbage plants and the accumulation of radionuclides in them, it is not possible to rate different species according to their accumulation capability up to now.

Many factors affect to the input of radionuclides in plants: the distribution of root system in soil, vegetative period, structure traits of leaves, biomass and others biological traits of plants.

Significant influence on the accumulation of radionuclides by herbage plants is exerted by the conditions of their growth. The regularity is observed in the increase of radionuclides content in plants, which is growing in the conditions of hydromorphism.

As well, radionuclides accumulate in natural plant stand in large amounts, which related to delay of radionuclides in the top soil and grass sod of meadow formations.

For evaluating the input of radionuclides from soil to plants different indicators are used. One of the most widely used indicator is the build-up factor or concentration factor. It is the ratio of the radionuclide content in terms of mass of plants or soil, respectively [2].

It should be noted that the activity of Cs-137 and Sr-90 in soil for 30 years decreased several times due to the half-life. Now in the Orel region, the average content of Cs-137 in the upper soil layer (0-10 cm) is: 41.36 Bq/kg in the Orel district, 26.04 Bq/kg in the Pokrovskoe district, 84.36 Bq/kg in the Dmitrovsk district, 52.89 Bq/kg. in the Glazunovka district.

According to changes of the radionuclide activity, it is necessary to improve the system of bioindicators of radioactive contamination. The use of bioindicators can help to identify and evaluate the

contamination of the territory with radionuclides not only at the time of the accident, but also after a while.

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LANDFILLS IN THE MOSCOW REGION: CURRENT ENVIRONMENTAL SITUATION AND PERSPECTIVES OF RECULTIVATION

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Abstract: Problems of solid domestic waste (SDW) treatment in Moscow and the Moscow Region are considered in the article. The results of a research of landfill negative impact on the environment are given (case study of the Kulakovskiy landfill in the Chekhov district). The impact on the atmospheric air, surface and ground water and soil is taken into account. In the paper, the available methods of landfill remediation are considered, in particular, perspectives of using bioremediation for landfill reclamation are evaluated. The results of calculating the methane concentration show that this parameter has decreased due to bioremediation measures.

Key words: solid domestic waste, polygon, landfill, landfill gas, pollutants, recultivation, aerobic bioremediation.

According to numerous studies, the Moscow Region occupies a leading position in the Russian Federation in the volume of production and burial of solid domestic waste (SDW). So, according to the Federal Service for Supervision of Nature Resources, 11.1 million tons of solid and other municipal wastes were generated in Moscow and the Moscow Region in 2011, with 95% of SDW being buried [1].

Despite the construction of sorting and waste processing plants in the Moscow region, most of the waste from Moscow and the Moscow region continues to be disposed of in the landfills, careers and dumps of the Moscow region. As of 1st September 2017, in the Moscow region there are 16 landfills with the residual capacity of about 40 million tons. With this SDW generation volume, the existing landfills will operate for 3-4 years [1].

"Kulakovo", a huge landfill for burial of household waste and equivalent to it industrial waste, is located in the Chekhov district of the Moscow region. It worked in a mined-out quarry from 1966 to 1st September 2017. Garbage is trucked here not only from Chekhov and the Chekhov district but also from some neighboring districts. The incoming garbage volumes significantly exceed the estimated ones, which amount to 164 tons per day or 21 tons per hour (Fig. 1, 2).

Landfill operation was started without any preliminary engineering preparation of the basement of the SDW storage area (without the necessary waterproofing): industrial waste was laid directly on the bottom of a worked out sand quarry.



Fig. 1 – The actual size of the landfill “Kulakovo”



Fig. 2 The landfill “Kulakovo” condition (the data as of 29.09.16) [2]

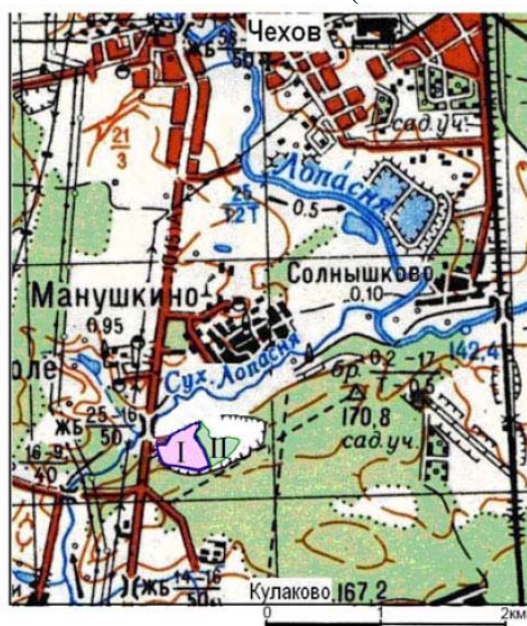


Fig. 3 The administrative scheme of the location of "Kulakovo"
 I. The lot where the extension of the landfill life cycle and its
 recultivation are planned;
 II. The lot of the "encumbrance", which is being reclaimed in
 accordance with the agreement № P-06-12 of 11.07.2017 between
 OJSC “PromEcoTech” and Stremilovskoe rural settlement.

The total career area in the modern contour is 26.92 hectares (Fig. 3), including:

- 13.62 hectares - the existing landfill territory (on the land lot);
- about 2 hectares – a previously reclaimed section;
- 6.04 hectares - the so-called "encumbrance territory", i.e. SDW storage area outside the land allotment;
- 5.26 hectares - part of the career free from SDW partially covered by vegetation as a result of weed infestation.

Landfill gas emissions (methane - 2418.009 t/year, carbon dioxide - 39.396 t/year, hydrogen sulfide - 0.028 t/year and ammonia - 1.749 t/year) are the main objects of the negative impact of the Kulakovskoye SDW testing site on the atmospheric air. They are formed during the biodegradation of waste organic part and cause an unpleasant smell in the impact zone (about 500 m). Also emissions of fuel combustion products during the operation of transport negatively affect the atmospheric air. Data on background concentrations of these substances is given in Table 1.

Table 1- Data on background concentrations of pollutants

Pollutant	Emissions, tone/year
Carbon dioxide	3,569390
Methane	1,749000
Hydrogen sulfide	0,003450
Ammonia	0,133000

The contaminated sewage (filtrate) adversely affects adjacent surface water bodies. The filtrate is formed when the waste components are washed out of the landfill mass. It is followed by horizontal migration to the basin of the river Suhaya Lopasnya. This is due to poor implementation of project environmental protection measures. At the same time, the filtrate has a negative effect on groundwater with vertical filtration at the first aquifer from the surface.

Littering and soil contamination are the negative impact of the SDW landfill on the soil cover. Littering occurs due to wind blowing the landfill contents and spontaneous garbage ejection from vehicles. The width of the litter zone is from 100 to 500 meters. According to

scientists [3,4,5], technogenic haloes of toxic micro-element, for example manganese, cobalt, copper, lead, zinc, etc., are formed in the soil. This occurs as a result of blowing up dust particles and water runoff from the landfill. This information was confirmed by the results of conducted studies (Table 2). According to the table, soil contamination within a radius of several hundred meters reaches values exceeding the background indicators dozens of times.

Table 2 - Content of pollutants in the soil

Pollutant	Content in the soil, mg/kg		Background	MPC	TPC*
	Min value	Max value			
Barium	172	452	203	-	-
Vanadium	18	52	83	150	-
Cadmium	<0,05	1	0,3		1(2)
Cobalt	4,7	107	7,2	-	-
Manganese	187	1099	900	1500	-
Copper	5,7	476	27	-	66(132)
Molybdenum	0,1	2,6	1	-	-
Arsenic	2	13	3	2	5(10)
Nickel	7,8	108	20	-	40(80)
Tin	0,6	11	5,2	-	-
Lead	7,9	270	26	32	65(130)
Strontium	38	96	30	-	-
Antimony	<0,05	2,1	0,2	4,5	-
Chromium	14	38	46	-	-
Zinc	36	187	50	-	110(220)

Note: *TPC for loamy and clay soils with pH (KCl) <5.5, within the brackets - pH (KCl) >5.5

A secondary pollution source will be formed in the soil cover in the landfill impact zone, assessing soil pollution in terms of the risk of groundwater pollution. Higher amounts of elements, such as zinc, nickel, lead, manganese, chromium, vanadium, tin, cobalt, will accumulate in the soil. The proportion of mobile forms is quite large. The supply of these elements to groundwater can occur with infiltrating, especially acidic, atmospheric precipitation. Soil

contamination can occur as a result of pollutants coming in by spraying or with surface runoff.

Currently, a complex of design and survey work is underway. The aim is to extend the life cycle of the landfill and the encumbrance territory and its reclamation. There are some ways of “Kulakovo” landfill recultivation:

1) Transporting accumulated waste to another site for further recycling and disposal of its unused components. This approach is not possible in the Moscow Region since there are no unloaded polygons of similar capacity. The most important is the fact that contamination of the residential area with landfill gas can increase after opening the site of SDW in the immediate vicinity of the housing development.

2) Using additional shelter: a special protective layer of cob materials that completely blocks diffusion output of the landfill gas into the atmosphere. The topsoil is laid on the protective cover and a natural grassplot is formed. This method requires a lot of time, changes the shape of the relief and, in addition, after the work completion citizens' access to this territory is prohibited.

3) Using the technology of aerobic bioremediation. This technology completely eliminates the processes of gasification and formation of filtrate in a short time. In addition, it allows converting SMW mass to stable and inert state. An environmentally safe area is formed after using this technology. This area is suitable for further use for recreational purposes.

The last method is most effective. The aerobic bioremediation is a complex of methods for cleaning water, soil and the atmosphere using the metabolic potential of biological objects such as plants, fungi, insects, worms, and other organisms. This technology transforms anaerobic processes of organic matter decomposition in a landfill body into aerobic processes. The final products of these aerobic processes are carbon dioxide, water and compost.

Bioremediation provides an opportunity to

- eliminate greenhouse gas emissions (methane) in landfill gas;
- eliminate rotting waste smell;
- clean drainage water;
- accelerate the degradation of SMW organic component;
- eliminate the dispersion of light fractions and dust by the wind;

- convert the microorganism anaerobic conditions into the aerobic conditions;
- increase the lifespan of landfills for several years;
- compact the landfill body (the ramming method);
- save the land or free it up for targeted use.

According to the calculations performed using the procedure [6], the concentration of methane, as the main and most dangerous component of greenhouse gases, may decrease (with 95% of methane recycled) to 19.2 tonnes per year, as a result of bioremediation.

Nowadays the recultivation method has already been applied at the SMW landfill “Nekrasovka” in the South-East district of Moscow. It is planned to turn the polygon area into a recreational zone where a family entertainment park will be built [7].

Thus, the aerobic remediation technology is the most advanced and appropriate ways of landfill recultivation, from the environmental point of view. However, the economic feasibility of this method is still in question. Because it requires taking into account specific natural, geographical, climatic, technological and social factors in each case.

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**LAS CONSECUENCIAS GEOQUIMICAS DE LA APLICACIÓN
DE AGENTES ANTICONGELANTES PARA EL MEDIO
AMBIENTE**

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Abstract: Los restos de agentes anticongelantes en las carreteras provocan condiciones desfavorables en los ecosistemas urbanos.

Palabras clave: contaminación del suelo, agentes anticongelantes, restos de agents anticongelantes, Moscú, áreas urbanas, seguridad ecológica, salinización del suelo, alcalinización del suelo.

La acumulación de sales en la capa superficial del suelo en razón de la aplicación de agentes anticongelantes provoca los efectos negativos para los ecosistemas urbanos. En invierno los restos de agentes anticongelantes se barren a los céspedes cerca de caminos. Hay algunos datos sobre que agentes anticongelantes debido a sus características afectan animales, humanos y el medio ambiente [1, 2, 3, 4]. En este contexto, el objetivo del trabajo fue investigar la dinámica

del contenido de sales solubles en la capa superficial del suelo cerca de de autopistas en el sur-oeste de Moscú.

El suelo se probó desde los bordes de las carreteras desde la profundidad de 100 mm dos veces: antes de la temporada de limpieza invernal (noviembre de 2016) e inmediatamente después del final de la limpieza (marzo de 2017). Fueron probados 7 sitios de total que se ubican cerca de las carreteras más grandes del sur-oeste de Moscú: A - intersección de Lomonosov Ave y Vernadsky Ave; B - intersección de Leninsky y Lomonosov avenidas; C - Leninsky avenida (cerca de Y.Rakady); D - la avenida Sevastopolsky; E – la calle Profsoyuznaya (Konkovo metro); F – la calle del Académico Bakulev; G - Ronda de circunvalación de Moscú (Tyopliy Stan metro). En todos los sitios las pruebas se implementaron por los perfiles que se ubican perpendicularmente a la calzada: los puntos 1 y 2 se encuentran a una distancia de 0,1 m y 3,5 m de la calzada. La numeración de las muestras consistió de la letra del lugar en la área (1 o 2) y de dígito que marca la área (por ejemplo, A-1, D-2, etc.). De las muestras se prepararon extracto acuoso, en el que se determinaron Cl^- , SO_4^{2-} , HCO_3^- , CO_3^{2-} , Ca^{2+} , Mg^{2+} , $\text{Na}^+ + \text{K}^+$, residuo seco, pH, Eh, conductividad y salinidad.

Los resultados se puede ver en los imagines 1-3. Se muestran equilibrio ácido-base: en otoño los suelos tenían reacción principalmente neutro y ligeramente alcalino, y en primavera los suelos tenían reacción alcalino (ver imagen 1a). Además, directamente en las carreteras, el pH del suelo era mayor que en la distancia de 3-5 m de la acera. Así, en primavera la agresividad alcalina de los suelos aumenta.

El contenido de residuo seco en los extractos de agua de los suelos en los puntos que están cerca de las calzadas difiere en primavera y en otoño (imagen 1b). En primavera, en todas las muestras se han registrado casi el doble cantidad de de residuo seco en comparación con las muestras de otoño. El grado de salinidad de los suelos varió entre 0,1-0,4%.

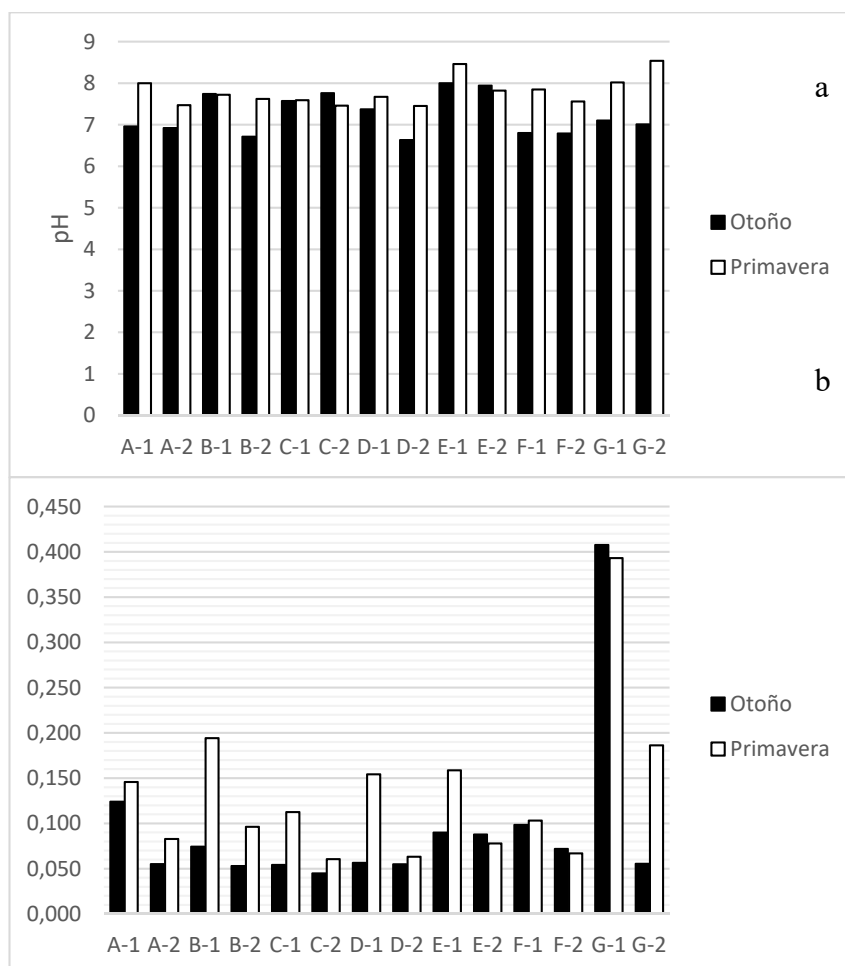


Imagen 1. Los valores de pH (a) y residuo seco (b) en los suelos en otoño y en primavera

Los extractos acuosos de acuerdo con la composición iónica pertenecen generalmente a la clase hidrogenocarbonato-cloruro-sodio. Entre los cationes del otoño, HCO_3^- es un ion predominante (imagen 2a), y en primavera - ion de cloro (imagen 2b). El cloro entra en el forma de sales de sodio y calcio (NaCl y CaCl_2), que se utilizan como

componentes principales de agentes anticongelantes. El contenido de SO_4^{2-} casi no ha cambiado durante el invierno.

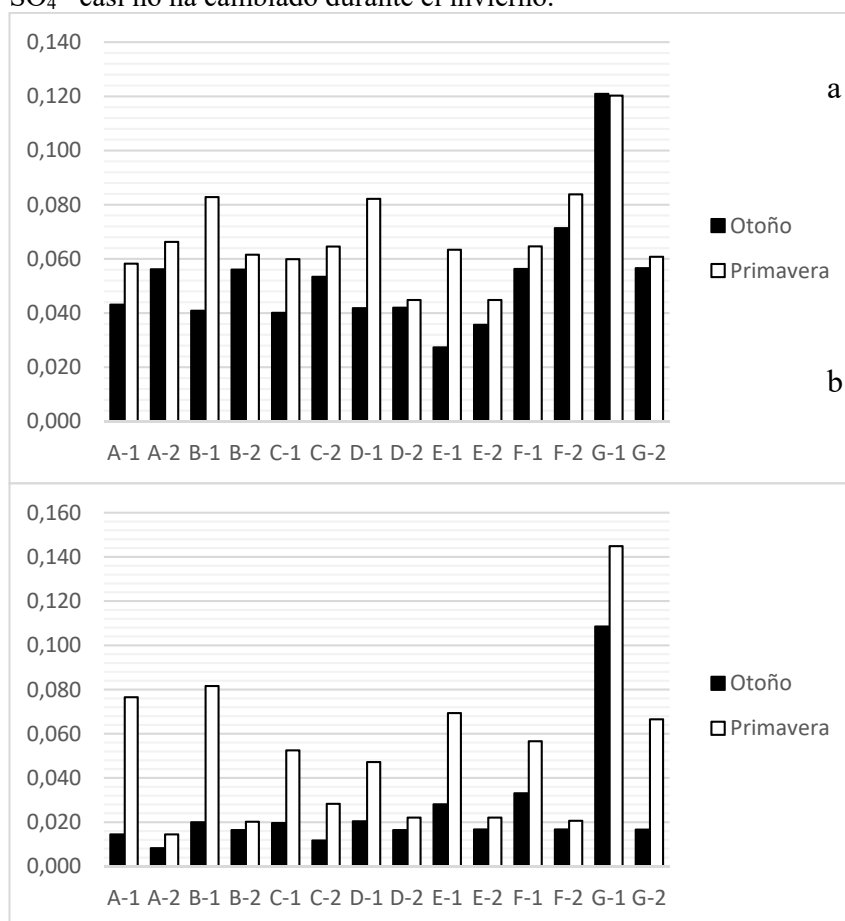


Imagen 2. El contenido de iones HCO_3^- (a) y Cl^- (b) en los suelos en otoño y en primavera

Entre los aniones en los suelos se predominan Na^+ y K^+ , que representan 87% de todos los aniones (imagen 3a). En primavera el contenido de Na^+ y K^+ se aumentó especialmente cerca de las carreteras (más del doble), es que NaCl es un parte integrante de agentes anticongelantes que se utilizan en Moscú [5]. Otro componente importante es CaCl_2 - el contenido de Ca^{2+} se muestra en la imagen 3b:

se puede observar la aumentación del contenido de iones Ca^{2+} durante el período invernal en todos los sitios de prueba sin excepción. Lo del anion del magnesio, el contenido promedio se mantuvo casi sin cambios.

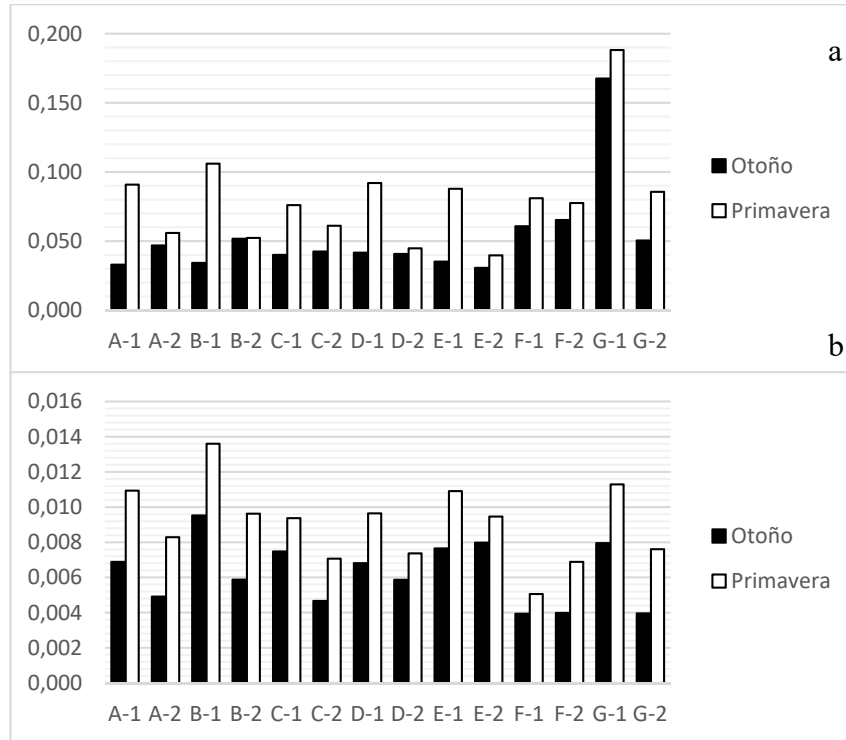


Imagen 3. El contenido de iones $\text{Na}^+ + \text{K}^+$ (a) y Ca^{2+} (b) en los suelos en otoño y en primavera

En vista de los resultados se puede concluir que la alcalinización de los suelos es una consecuencia de la entrada de agentes anticongelantes. Es el razón del crecimiento de agresividad química de los suelos, que provoca la transformación de los ecosistemas urbanos. Además por la aplicación de agentes anticongelantes se puede desarrollar la salinidad de los suelos.

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**CRITICAL LOADS OF POLLUTANTS ON ECOSYSTEMS OF
THE REPUBLIC OF KAZAKHSTAN**

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Abstract: At the present time there is a growth of anthropogenic load on the environment. Biogeochemical processes taking place in the biosphere, determine the stability of the ecosystem to pollutants. Understanding the mechanisms regulating the flow of matter in biogeochemical cycles will allow a quantitative assessment of the environmental risk from a variety of pollution sources.

Key words: critical loads, acidity load, ecosystem, ecological risk, stability of ecosystems.

Introduction. A quantitative assessment of the ecological risk of ecosystems will prevent negative consequences by taking measures to reduce the harmful effects on vulnerable ecosystems, thus achieving

maximum environmental benefits by reducing emissions of pollutants. It is necessary to ensure that the anthropogenic loads of pollutants fit within the framework of natural fluctuations of different parts of biogeochemical food chains to prevent contamination and degradation of ecosystems [1, 2].

Methodology. Calculation of critical loads was carried out based on the methodology of the European Coordination Center for Effects. V.N. Bashkin introduces the notion of a critical acidity load in determining critical loads on ecosystems in Eastern Europe, which is defined as the maximum intake of acidifying sulfur and nitrogen compounds, below which there is no harmful acidifying effect on the ecosystem for a long period (50-100 years) [3].

Compounds of sulfur and nitrogen oxides can act as acid agents together, and nitrogen, entering ecosystems and being a nutritious element, can cause an eutrophication.

Therefore, it is necessary to calculate the following indicators for the calculation of critical loads (Table 1):

- maximum acidity load (CL (A) max);
- minimum nitrogen load (CL (N) min);
- eutrophying nitrogen load (CL (N) nutr) [4].

Table 1. Formulas for calculating critical loads

Index		Formula
Minimum nitrogen load	Reflects the minimum level of nitrogen supply, below which the productivity of ecosystems will not be maintained, is applicable to agricultural land	$CL(N)min = N_i^* + N_u^*$
Eutrophying nitrogen loading	Reflects that level of nitrogen supply, which does not form its excess in the ecosystem and does not lead to the process of eutrophication, which in turn can lead to a change in species diversity	$CL(N)nutr = N_i^* + N_u^* + N_{lc} + N_{de}^*$
Maximum acidity load	Reflects the level of intake of acid-forming compounds, above which there will be a negative impact on ecosystems.	$CLmax(A) = C_t^* (BC_w - ANC_{lc}) + (BC_{dep} - BC_u)$

Results and conclusion

- The main factor affecting the stability of ecosystems to acid deposition is the content of basic cations in the soil; therefore, the most stable ecosystems for the intake of nitrogen oxides and sulfur are herb-red-steppe steppes on typical chernozem soils, fescue-feather grass on dark chestnut soils and wormwood-sod- on light chestnut soils, which occupy 23% of the territory of the republic and are distributed mainly in the west and north of the Republic of Kazakhstan.

- On soils with a low content of acid neutralizing components, ecosystems with low acid resistance have been formed, occupying 12% of the study area. These ecosystems are represented by psammophyte-sand-feather-grass communities on sands, wormwood-boylach communities, and also saxaul and psammophytic-peacock communities on sands, which have a low ability to neutralize acids.

- At the heart of the formation of ecosystem resilience to depositions of nitrogen compounds is a biological factor that reflects the level of nitrogen absorption, at which phytomass (eutrophication of ecosystems) will not increase. Ecosystems with the highest nitrogen loads (29% of the republic's territory) do not cause eutrophication predominate in the north and are represented by herbage-feather grass steppes on chernozems, turf grasses on solonetz soils, and also saxaul communities, because these communities absorb a larger amount of available nitrogen due to significant biomass .

- Psammophytic shrub communities on sands, wormwood, biyurgun and boylach communities on solonetz, which are prevalent in the south, where the biological activity decreases due to climate aridization, has a low resistance to the intake of nitrogen compounds, which affects the reduction in the uptake and accumulation of nutrient nitrogen in the ecosystem.

In conclusion

The values of the critical loads and an assessment of the potential risk of abuse of ecosystems has allowed to identify the regions that require measures to reduce the environmental impact to minimize the risk of negative consequences for ecosystems.

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SOIL PROPERTIES OF THE NORTHERN PART OF CASPIAN SEA FROM POINT OF VIEW OF DESIGN, CONSTRUCTION AND OPERATION OF OIL PLATFORMS

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Abstract: Industrial development of hydrocarbon deposits in the Russian part of the Caspian Sea began several years ago. The opening of a new oil "province" on the northern shelf of the Caspian Sea gave impetus to the development of all branches of the Astrakhan economy: production of hydrocarbons, international transport corridors, social infrastructure.

Key words: oil resources, pollution, Caspian sea shelf, Astrakan.

Introduction. In the period 1995-2006. 6 fields with reserves of more than 2 billion tons were discovered in the Caspian Sea, namely: 1.

The field named after Vladimir Filanovsky, 2. The field named after Yuriy Korchagin, 3. The field of 170 km, 4. Khvalynskoye field, 5. Sarmatskoye field, and 6. Rakushechnoye field. The first one (V. Filanovsky) is the largest field discovered in Russia over the past 20 years. Its recoverable reserves exceed 200 million tons of oil.

In addition, 10 prospectives for oil and gas have been identified in the course of geological exploration.

By now, schemes have been developed for the construction of four fields: the ones named after Yu Korchagin and V. Filanovsky, the Sarmatsky and Khvalynsky fields. The schemes for a number of fields off the coast of Turkmenistan are in development [1].

Methods and materials. We have studied the state of the Rakushechnoe field also known as The Filanovskoye field. This is a Russian gas-condensate-oil field, located in the northern part of the Caspian Sea, 190 km from Astrakhan. The depth of the sea is 7-11 m. It was opened in 2005. August 4, 2016, the drilling of the first well in the field gave the first oil. The official commissioning of the field for commercial operation took place on October 31, 2016 [1]. The center of the TSC platform is located in the water area of the Russian part of the Caspian Sea, in its northern shallow part, 190 km south of the city of Astrakhan, 20 km east of Maly Zhemtchuzhny (Small Pearl) Island and 20 km northeast of the Tyuleny (Seal) Island, in the Volga avantdelta [1]. Oil reserves: 220 million tons, gas reserves: 40 billion m³. Measurements of density, humidity, yield and rolling-out limit were made according to the methods of GOST 5180-2015. Three-axis tests were carried out on ST-10 and ST-70 stabilometers, according to GOST 12248-2010 [2].

During the tests, data were obtained on the granulometric composition, humidity, physical and physical-mechanical properties were determined. In the course of studying the physical and mechanical properties of soils, the strength characteristics were determined under conditions of undrained shear and by the method of unconsolidated undrained shear on a triaxial compression device [1]. The results are shown in Table 1.

Table 1. The results of laboratory studies of the composition and properties of the investigated soils

№	sampling depth m	Grading. Size of fractions, mm				Property indicators							
		>2	2-0,05	0,05-0,005	<0,005	W	ρ	ρ_d	ρ_s	ε	K_w	φ°	c
1	1,40-1,55	-	88,0	5,6	6,4	27,6	1,87	1,45	2,69	0,851	0,92	37	2
2	1,55-1,70	-	88,0	5,4	6,6	25,4	1,87	1,45	2,69	0,851	0,90		
3	1,15-1,45	0,4	69,6	5,4	4,6	28,7	1,87	1,45	2,69	0,851	0,90		
4	2,20-2,40		79,1	11,1	9,8	29,5	1,85	1,43	2,69	0,883	0,90		

Legend: **W** - natural humidity,%; **ρ** , **ρ_d** , **ρ_s** are the soil density, the soil skeleton density, and the solid particles density, g / cm³, respectively; **ε** – coefficient of porosity; **K_w** – degree of water saturation; **φ** – angle of friction, **c** – cohering, kPa.

The obtained data show that sand varieties play a predominant role in the structure of the soil section on the northwestern shelf of the Caspian Sea.

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**SINKHOLE HAZARD AND RISK OF ITS FORMATION IN
NIZNIY NOVGOROD REGION**

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Abstract: A number of karst risk assessment methods have been developed for the regions where the most significant hazard is presented by karst sinkholes. For this particular application karst risk is understood as specific probability of sinkhole development on a unit area per a unit time span.

Key words: Sinkhole, hazard, karst-suffosion, stochastic models.

For the typifying of natural and human-induced risks, including the karst-suffosion, it is advisable to first distinguish the two groups in accordance with the two existing ways of damage expressing, and then — the types of recipient objects. The formulas, that allow taking a unified position when assessing physical and economic damage caused by the destruction of territories and engineering objects due to geological processes, are discussed in the paper. Also I considered the approaches to the evaluation of sinkhole probability indices and two currently used stochastic models of subsidence-sinkhole development i.e. collapsing process, namely, exponential and linear ones.

The problem of karst risk assessment is very important for Russia. About 30% of the cities and towns in Russia experience considerable negative influence of karst processes. Industrial facilities and residential buildings in Moscow, Nizhny Novgorod, Dzerzhinsk, Kazan, Ufa, Tula, Bereznyy and some other cities, towns and settlements have been affected by karst causing damage or destruction [1].

A wide range of important problems arise in case of nuclear power plants (NPP) built on karst territories. Collapse risk is understood as probability of sinkhole development in a given area during a given time period resulting in the damage of economic, social and environmental types. The survey helps to evaluate the probability of sinkhole development in a particular area during a given time span. Risk assessment for the purposes of engineering and constructional development of karst terrains and use of karst risk concept in

engineering and environmental protection activity allows us to minimize inevitable damage. In the Federal law of the Russian Federation “On technical regulation” the concept of risk is understood as a probability of hazard to health and safety of the population and damage to property and the environment, with the account of heaviness of all hazards and damage [2].

Karst collapse risk here is understood as a probability of karst sinkhole development on a certain area per a certain time span which may lead to economic (A), social (B) and/or environmental (C) loss. If we define the probability of sinkhole development in a unit area A (supposedly $A = 1$ ha) per a unit time span (supposedly 1 year or 100 years), we get a specific risk value (Pr). In most practical cases, for the purposes of civil engineering the unit time T is 100 years, because (according to Russian national building specifications) it conforms with the predicted service life for the majority of constructions. The distribution parameter is intensity ratio of sinkhole development λ (specific average number of sinkholes developed on the area of 1 ha per 100 years) [2]. Distribution of sinkhole diameters d on vast territories (with the area of several km^2) is close to a lognormal type, and on small territories (with the area of several ha) it is close to a normal type. The distribution parameters enable objective assessment of average and maximal sinkhole diameter values (d_{mid} , d_{max}). Parameters λ , d_{mid} , d_{max} can be considered to be the most important results of the performed exploration [3]. Additionally, investigation must obtain data on some particular relevant engineering and geological conditions as well as anthropogenic effects which may exert influence upon intensity of sinkhole development on the area where the construction is placed [4].

Engineering and constructional development of karst-prone territories entails a number of important issues to be considered: need in constructional protection measures, validity of protection design parameters, minimization of economic, environmental and social components of damage, need in insurance of the particular construction, check list for construction site selection, specification on the mode of operation of the construction exposed to karst risk, etc.

Solution to the related problems is simplified by comparison between karst risk (Pr or Prb) and the corresponding acceptable risk (Rn or Rnb). Acceptable risk is understood as acceptable probability of certain negative effects. In many practical cases specific values Pr and

Rn are compared. Acceptable risk levels must be specified alongside with acceptable levels of economic damage (class A), social damage (class B) and environmental damage (class C). In design practice damage is often defined as loss caused by destruction of buildings or facilities by karst deformations. Economic loss is conventionally corresponded to the cost of the damaged building or constructions and other property, social loss – to probable loss of life or health hazard, environmental loss – to probable contamination of the environment [3].

Comparison between real specific risk of pollution of the geological environment at waste disposal landfills in karst lands and corresponding specific risks helps plan a system of nature-conservation activities in order to prevent pollution of the geological environment.

The physical risk of land loss is the simple integral characteristic of the both probability and strength of karst impact on the technosphere objects. The developed scale based on this assumption, makes it possible to objectively assess the degree of sinkhole danger in urban areas based on its two main indices — occurrence intensity and funnel diameter.

An improved version of the method for design parameter of constructional antakarst protection of buildings and facilities from sinkholes has been developed on the basis of «Guide to geological engineering surveys in areas of karst» by I.A. Savarenskiy and N.A. Mironov. The method described above has been tried in projects in Nizhny Novgorod region.

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PRIORITY AREAS OF SUSTAINABLE FOREST MANAGEMENT AND GREEN BUILDING

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COMPARISON OF THE SEQUESTRATION CAPACITIES OF THE 5 DIFFERENT TYPES OF PLANT COMMUNITIES IN INDIA USING THE SPATIAL MODEL OF THE GLOBAL CARBON CYCLE DEVELOPED BY TARKO A.M.

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Abstract: This article describes differences between the five types of plant communities in India (coniferous mountain alpine, sub-tropical broad-leaved hill, tropical wet ever-greens, tropical moist deciduous, tropical dry deciduous) in carbon capture, the causes of these differences and mechanism of carbon absorbing.

Key words: India, emission of carbon dioxide, ecological problems of developing countries, global carbon cycle, global climate change.

Introduction. The problem of climate change is acute for India today. India contributes to global warming, and thus it becomes vulnerable to adverse effects on it.

Since India has become an independent state, significant structural changes have taken place in its economy, which has transformed India from a backward agrarian country into a rapidly developing agrarian-industrial state. GDP of India is more than half depends on the service sector (transport, communications, trade, social services), by 28% from industry and only by 14.2% from agriculture. Despite this, agriculture remains the principle sector of the Indian economy, employing about 60% of the population. The constant growth

of the population in the country is the cause of an increase in the demand for food, energy and other resources. In order to meet increasing needs, more and more areas of forests are being converted to agricultural lands, and together with the inherent problems for South Asia - overgrazing, urbanization, the use of wood for firewood, India has become one of the most deforested countries in the world.

Not only the loss of forest as the main land-based absorber of carbon dioxide is a consequence of deforestation, but also the secondary emission of CO₂ as a result of slash-and-burn agriculture. It has been established that 20 to 30% of greenhouse gas emissions are a consequence of deforestation. When trees are cut down and burned, they produce about 50% of the carbon dioxide accumulated in photosynthesis, which becomes a significant factor in increasing carbon dioxide emissions worldwide and in India in particular [4].

The total area of Indian forests is 70.7 million hectares (2015), that is, about 23.8% of the country's territory [5]. They are distributed unevenly and belong to different types of plant communities.

According to the Sinitsyn's and Loginov's monograph, 1971 [2], in India the following types of plant communities grow:

- high-mountainous forests;
- mountain alpine temperate climate forests;
- sub-tropical broad-leaved hill forests;
- tropical wet ever-greens forests;
- tropical semi-evergreen forests;
- tropical moist deciduous forests;
- tropical dry deciduous forests;
- tropical thorn forests;
- tropical dry ever-green forests.

Methodology. For 5 types of its plant communities, calculations were made on the spatial model of the global carbon cycle of the Computing Center of the Russian Academy of Sciences, developed by Tarko A.M. to compare the sequestration capacities of different forest ecosystems. The model took into account: the percentage of felling and soil erosion for each type of plant communities, as well as the volume of industrial carbon dioxide emissions. Graphs of carbon content changes in phytomass and humus in 2000-2060 were constructed [3].

Table

Increase of the total amount of carbon in phytomass and humus of
different types of plant communities in India by 2060

Type of plant communities	Increase of the total amount of carbon
Coniferous mountain alpine	13,4
Sub-tropical broad-leaved hill forests	11,1
tropical wet ever-greens forests	10,43
tropical moist deciduous forests	10,6
tropical dry deciduous forests	11,8

Results. According to the obtained results, coniferous mountain alpine forests have the best efficiency for accumulating the carbon, the increase in total carbon in which by 2060 will amount to 13.4%. This thesis is confirmed by the foreign studies of Reddy et al., 2016, which point to the high deposition capacity of the Himalayan forests: in Arunachal Pradesh, located in the eastern part of the Himalayas, 11.27% of the total carbon consumption in forests. However, this type of plant communities is a dangerous risk for forest fires because of the slowly decaying coniferous fall.

According to model calculations the smallest increase will be observed in tropical wet ever-greens forests, which is explained by a sharp decrease in the carbon balance in the period 2000-2020, due to intensive logging and soil erosion associated with unsustainable land use.

In conclusion. The reason for the general increase by 2060 in India is due to the effect of increasing the concentration of carbon dioxide in the atmosphere and the average annual temperature. This phenomenon is explained by the regulatory function of CO₂ on plant development. The growth function is enhanced by the formation of a new photosynthetic apparatus. This demonstrates the "double" role of CO₂: as a substrate in the process of photosynthesis, and as a regulator of growth. For tropical moist deciduous forests and tropical wet ever-greens forests, a decrease in the amount of carbon in the phytomass and humus until 2020 and 2030, respectively, is observed. In this case, these plant formations are regarded as a net source of carbon for the atmosphere. The release of CO₂ in the oxidation of biomass is not a single source of carbon in the deforestation of tropical forests.

Conversion of forest lands to agricultural lands, when a significant part of organic matter is oxidized during plowing, can also lead to carbon emissions into the atmosphere [1].

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CHARACTERISTIC OF HERBACEOUS PLANTS OF PINE FORESTS IN MOSCOW.

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Abstract: In this article the results of studying biomorphological range of plants of some pine forests of Russia are described. Data on species diversity of the studied habitats are presented.

Keywords: plants, life forms, pine forests, recreational loading.

The area of the woods in Russia makes more than 809 million 90 thousand hectares [1], 17% of them are pine forests where the dominating breed is the Scotch pine (*Pinus sylvestris*). Due to the weak closeness of tree crowns, herbaceous plants in the pine forest receive a

large amount of heat, moisture and light. Therefore, the herbaceous stage is well developed here. Biodiversity of pine forests is the topical issue of modern phytocenology in connection with continuous anthropogenous transformation of forest ecosystems.

The purpose of this article was drawing up biomorphological range of plants of pine forests. Species diversity of pine forests of national park "Smolenskoye Poozerye" and three Moscow parks (the Alyoshkinsky park, national park " Losiny island", Silver pine forest) were investigated. Summary species lists taking into account route observations and geobotanical descriptions were made (by standard technique).

K. Raunkiaer system was used to describe the types of life forms of herbaceous plants. [2, 3]. 25 geobotanical descriptions were made.

Life-form of plants is the set of external morphological features of plant reflecting its fitness to environmental conditions [4]. In any habitat, there are a number of conditions that are optimal for the growth of plants of a certain life form and eco-cenotic confinement. According to the dominant life forms of plants, it is possible to learn about the environmental conditions of this phytocenosis.

Total number of species of herbaceous plants on all habitats made 65 types, in national park "Smolenskoye Poozerye" - 61 species in the Alyoshkinsky park - 40, in Silver pine wood - 28, in national park "Losiny island" in the first habitat- 35 and in the second – 33.

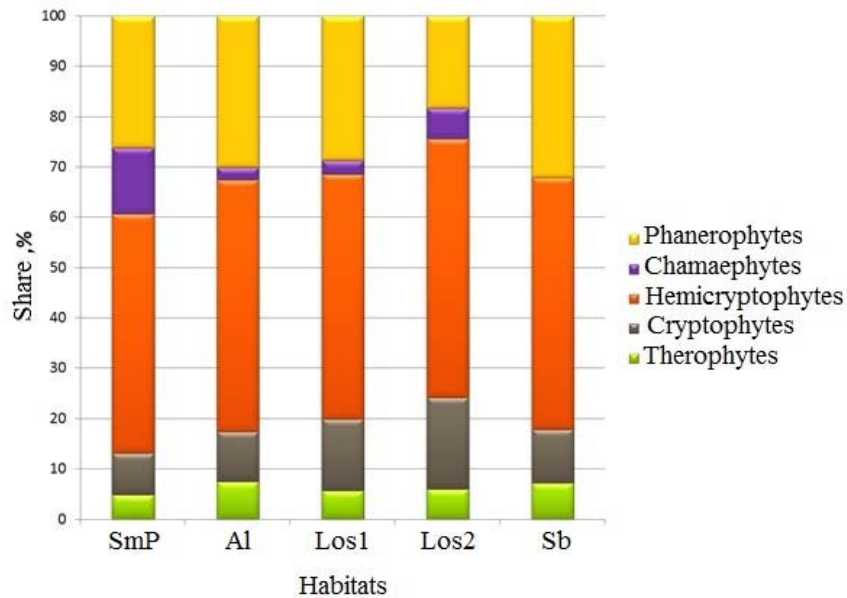


Fig. 1 Ratio of life-forms of plants in pine forests on the K. Raunkiaer system.

Symbols: SmP - Smolenskoye Poozerye; Al - Alyoshkinsky park; Los1 and Los2 – habitats in Losiny island; Sb - Silver pine wood.

By consideration of ratio of life forms of plants (fig. 1) hemicryptophytes is obvious that which is typical for the woods. The chamaephytes, which are an indispensable component of the undisturbed pine forest, are completely absent in the Silver pine wood, most likely, it is connected with the fact that this is the habitat with the most dense footpath network and poor species composition.

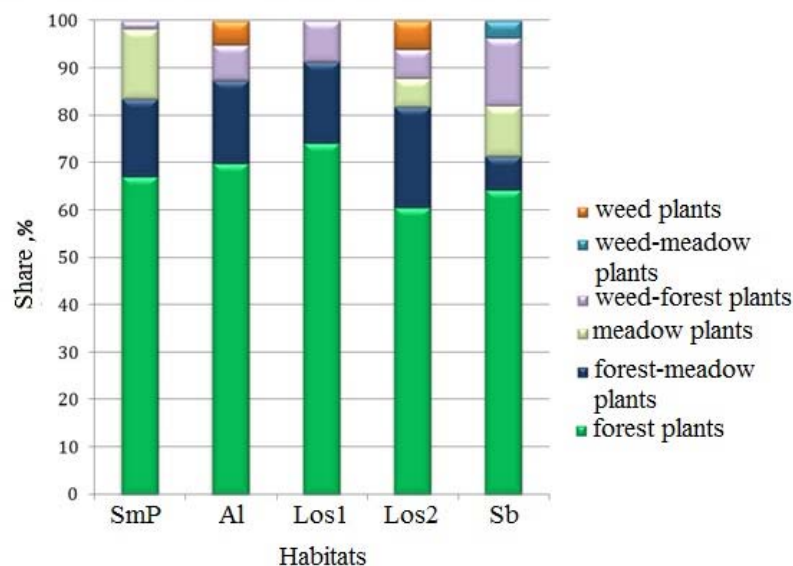


Fig. 2 Ratio of eco-cenotic groups herbaceous plants of pine forests of the studied habitats.

Symbols: SmP - Smolenskoye Poozerye; Al - Alyoshkinsky park; Los1 and Los2 – habitats in Losiny island; Sb - Silver pine wood.

Most species of all five phytocenoses are forest species (which is natural) (fig. 2); while the greatest percentage of forest species we observe on the Losiny Island site No. 1. However, the smallest proportion of forest species belongs to the second site of the same park (Losiny Island №2).

Weed species were found only in Alyoshkinsky park and on the site Losiny island №2, and the weed-meadow species (*Artemisia vulgaris* L.) was found only in the Silver pine wood.

Conclusions:

- Species diversity is higher in the national park Smolenskoye Poozerye, and among the three Moscow parks - in the Alyoshkinsky park.

- By consideration of ratio of life forms of plants hemicryptophytes is obvious. The chamaephytes are completely absent in the Silver pine wood, most likely, it is connected with the fact that

this is the habitat with the most dense footpath network and poor species composition.

- The best situation in terms of the spectrum of eco-cenotic groups of plants is the №1 site in Losiny island. Most of the weed component was found on the site in the Silver pine wood.

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ENERGY-SAVING, ENVIRONMENTALLY FRIENDLY CHEMICAL AND TECHNOLOGICAL PROCESSES

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ESTIMATION OF THERMAL ENERGY USE EFFICIENCY AND HEAT PUMP SYSTEM APPLICABILITY IN COMPARISON WITH OTHER THERMAL ENERGY SOURCES

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Abstract: A heat pump is a unit that allows to generate thermal energy from low-temperature sources. Therefore, the priority task is to replace existing boilers with heat pump systems. This solution contributes to reducing fossil fuels consumption and carbon dioxide emissions.

Key words: thermal energy, heat pump system, alternative energy source.

Introduction. Recently, models of using low-temperature heat (for example, from wastewater heat) are increasingly applied within programs of energy-efficient technology management. [1] The technology of using a heat pump unit for utilizing wastewater heat can also reduce a negative load on the environment. Therefore, in this study heat pump systems are compared with other thermal energy sources (electric heating, gas boiler house, boiler house by imported fuel) to understand if this technology is energy-efficient.

Methodology. When studying wastewater, it is necessary to consider it as energy feedstock not waste.

One of the possibilities to solve the problem of wastewater heat recovery is applicability of heat pump systems. Their implementation in flow diagrams will make it possible to use a source of low-potential heat, reduce a negative load on the environment and decrease heat and electricity costs. [2, p. 43]

A heat pump is a unit that allows to generate thermal energy from low-temperature sources (air, water and soil). Then it can be used, for example, to heat. The environmental effect of using this technology allows excluding local greenhouse gas emissions that are formed

while fuel burning. Therefore, the priority task is to replace existing boilers with gas or liquid fuel, systems operating on the heat exchange principle. This solution contributes not only to reducing fossil fuels consumption, but also to decreasing carbon dioxide emissions. [3, p. 18; 4, p. 68]

The main factor that determines the efficiency of a unit is produced energy quantity and primary energy quantity consumed while device is operating on returned energy. [5, p. 32]

Another important factor is the cost of thermal energy. It will be the envy of keeping the increasing rate of tariffs for heat supply, which usually constitutes a significant part of payments for housing utility infrastructure. The heat pump operation with the normally unused energy in a small part of the water in the heating system can provide (after a full payback) up to 10% of the heating costs saving. [5, p. 33]

The optimal capacity of a heat pump system varies from 60 to 70% of the capacity set by the manufacturer. In this case, a heat pump can provide more than 95% of heat energy necessary during the heating season. Even so its average seasonal coefficient of performance (COP) is approximately 3,0 for Central Europe. [6] The operation factor of primary fuel is easily calculated for this type of systems if the performance factor of thermal power plants varies from 40% (condensing thermal power plants) to 55% (combined cycle power plants). Thus, the operation factor of primary fuel is from 120% to 165% for a heat pump system, that is 2-3 times higher than the same operating parameters of central heating systems (50-60%) or gas boilers (65%). [4, p.73; 7 p. 49]

There is a lack of data, so it was decided to make a system comparative evaluation and assess the heat pump system applicability. Estimation of the thermal energy use efficiency and the heat pump system applicability in comparison with other thermal energy sources (electric heating, gas boiler house, boiler house by imported fuel) has been made. Points were awarded for each evaluation indicator: from 1 to 3. Total points for each heat supply systems were counted. The best heat supply system has the largest total score.

Discussion. Estimation of the thermal energy use efficiency and the heat pump system applicability in comparison with other thermal energy sources (electric heating, gas boiler house, boiler house by imported fuel) has been made. Points were awarded for each evaluation

indicators: from 1 to 3. Total points for each heat supply system were counted. The best heat supply system has the largest total score.

Table 1. Estimation of the thermal energy use efficiency

Heat supply system / Indicator	Electric heating	Point	Gas boiler house	Point	Boiler house by imported fuel	Point	Heat pump system	Point
Installation costs	Low	3	High	1	High	1	High	1
Operating costs	Low	3	Medium	2	Medium	2	Medium	2
Energy efficiency	Low	1	High	3	Medium	2	High	3
Thermal energy price	High	1	Low	3	Medium	2	Low	3
Environmental damage	Medium	2	Medium	2	High	1	Low	3
Fire safety	Medium	2	Low	1	Low	1	High	3
Waste formation	Low	3	Medium	2	High	1	Low	3
Shipping costs from source to consumer	Medium	2	Medium	2	High	1	Low	3

Process automatization	Yes	3	No	1	No	1	Yes	3
Power consumption	High	1	Medium	2	Medium	2	Medium	2
Thermal loss	Low	3	High	1	High	1	Medium	2
Overall point		24		20		15		28

The estimation showed that heat pump systems have the largest total score (28).

In conclusion, the operating performance estimation shows that the heat supply efficiency of a heat pump system is higher than that of an electric system, gas boiler house and boiler house working on imported fuel. First of all, it is because of minimal harm to the environment and relatively high energy efficiency. The lowest total score (15) is for a boiler house working on imported fuel. This is due to its negative implementation, as well as high fuel transportation costs and energy-consuming processes.

The main disadvantage of heat pump systems is high capital costs in comparison with other systems.

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PROSPECTS FOR BIOENERGY USE IN GHANA: A SWOT ANALYSIS

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Abstract: The article will focus on Ghana's energy sector in general and the relevance and potential of bioenergy in the country. This will be followed by a discussion of some challenges and threats of the expansion of this sector. The strengths, weaknesses, opportunities and challenges using the SWOT analysis methodology is highlighted and analyzed.

Keywords: Prospects, sustainability, bioenergy utilization, Ghana, SWOT analysis.

Introduction: Historically, biomass has dominated Ghana's energy supply.

Assessments indicate that biomass energy consumption in Ghana, in the form of wood fuel, is twice as large as other energy sources, especially electricity and petroleum products, combined. For instance, the country relies on biomass/charcoal (39.8% in 2014), gas and crude (plus petroleum products-46.6%), and electricity (13.6%) to meet the total energy needs of its population and industry. Currently however, electricity demand outweighs supply thereby creating an erratic electricity distribution situation. Bioenergy could sustainably contribute between a quarter and a third of global primary energy supply in 2050. It is the only renewable source that can replace fossil fuels in all energy markets – in the production of heat, electricity, and fuels for transport. However, expansion of bioenergy also poses some challenges and threats. Biomass energy is likely to continue to dominate as a prime energy source in Ghana.

Methods and research design:

This article is basically a mix of survey, literature and reports review, as well as information from stakeholders. The study was conducted using the SWOT analysis model. SWOT Analysis is a useful technique for understanding your Strengths and Weaknesses, and for identifying both the Opportunities available as well as the Threats in any given scenario.

Results and Discussion:

Energy in Ghana:

Access to electricity, coupled with aggressive industrialization, is a key component in achieving sound economic and sustainable development. Power generation in Ghana has gone through a number of phases: starting with diesel generators and stand-alone electricity supply systems owned by industrial mines and factories to the hydro phase following the construction of the “Akosombo” dam and “Kpong dam” to the recent “Bui dam”, and now to a thermal complement phase powered by gas and/or light crude oil

Currently conversion technologies for agricultural, wood, municipal and industrial wastes are inefficient. Meanwhile the investment capital required to install these technologies are

comparatively higher making the energy supplied relatively expensive. Another challenge with the municipal solid waste generated in the country is its high content of incombustible materials.

SWOT ANALYSIS

In Ghana, renewable energy resources that have been explored include Bio Energy (Biomass including waste-to-energy and Bio fuel), Tidal and Wave power, Solar Energy (Photo-Voltaic and Thermal), Wind Power, and Hydropower (small and large). Ghana has no tradition in producing biogas. It only has about 100 biogas plants of which roughly half are in operation. As a general overview on the technological options available for the conversion of agricultural, wood, municipal and industrial wastes into bioenergy and other renewable forms of energy, the conclusions are summarized in a SWOT analysis.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • The organic composition of waste stream in Ghana makes the production of energy from it viable in most cases. • biomass wastes appear to have little or no costs • Low tech construction • Low process energy needed 	<ul style="list-style-type: none"> • Immature technology • Performance uncertainties due to lacking test • Durability uncertain • Technical problems unsolved (air tightness) • Security issues • Low market value of gas and compost
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Improves solid waste management • Reduces GHG emissions • Closes nutrient cycles by producing fertilizer • Creates jobs • Reduces dependency on fossil fuels, wood fuels and energy imports. • Renewable energy policies are being drafted 	<ul style="list-style-type: none"> • Impact of discovered oil reserves on renewable energies is uncertain • Trained personnel is rare • Acceptance of new technology is uncertain • Financial risks due to high discount rates

Conclusions and Recommendations:

The first step in identifying bioenergy opportunities in a given area is to examine feedstock availability – their quantity, location, and costs. An assessment of biomass resources is best followed by an assessment of the potential markets and competition for those feed stocks. Once a promising bioenergy opportunity is identified, a detailed feasibility study can be performed to determine its economic viability-- or a roadmap is developed to outline steps necessary for implementation of national research, development, and deployment efforts.

Policy issues should include the effective management of waste, the availability of efficient and low cost conversion technology, pricing of energy produced from waste and the establishment and enforcement of sustainable supply of biomass.

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Ivanova A.V.¹, Lukanin A.V.²
**AEROBIC COMPOST ENRICHMENT OF ORGANIC WASTE IN
THE CLIMATIC CHAMBER**

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Abstract: Organic wastes are of natural origin and possess biochemical characteristics ensuring rapid microbial decomposition at stable conditions in climatic chamber.

Key words: aerobic composting, organic wastes, climatic chamber, technology of effective composting, intensive oxidation and aeration, biofuel.

At present, about 130 million cubic meters (26 million tonnes) of biological waste are generated annually in Russia.

Various technologies are used to protect soil and water resources, protect the environment, and also utilize biodegradable waste.

The technology of aerobic biothermal composting has gained a significant practical spread in world practice. Organic waste is rendered harmless and converted to compost. Compost is a valuable organic fertilizer.

Compost is used as a biofuel for greenhouses, as artificial soils, for reclamation of disturbed lands, as an organic fertilizer for urban landscaping.

While processing, conditions are created that are detrimental to most pathogens, eggs of helminths, and larvae of flies. Technological measures allow to normalize the content of trace elements in the compost, including salts of heavy metals. Extracted waste components can be used as secondary raw materials in industry.

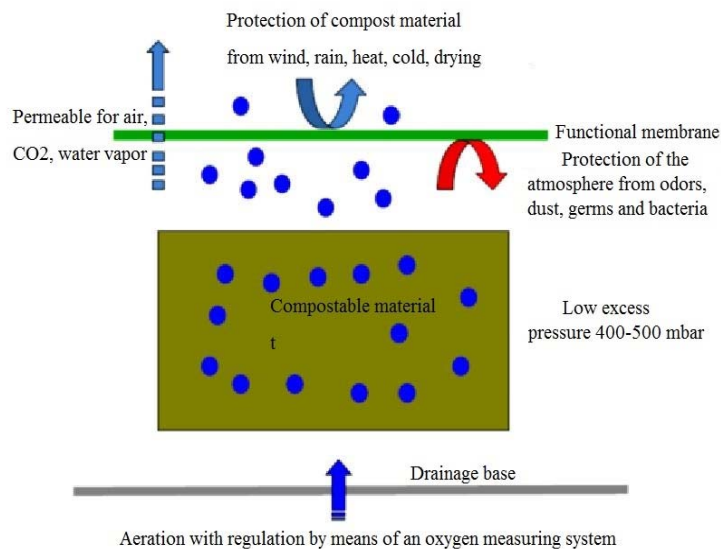
Compost is a loose product with the smell of earth, which contains at least 1% of nitrogen, 0.6% of phosphorus, 0.3% of potassium, 2.5% of calcium and 60% of organic matter [1].

Compost of organic waste in terms of trace elements is not inferior to traditional organic fertilizers (manure, peat). The content of such elements as cobalt, copper, zinc, manganese, etc. makes it possible

to consider compost as a source of microelements necessary for the growth and development of plants, with their normal application to the soil.

In aerobic composting, soil microorganisms decompose wastes of organic origin, forming mainly carbon dioxide, water, heat and a humus-like product, which later serves as a nutrient medium for plants.

The main element and "KNOW-HOW" is the "Climatic Chamber", which provides optimal composting conditions and isolation of the process from the environment [2].



Pic. 1 Function of the "Climatic Chamber"

Transformation and mineralization of organic substance occurs with aerobic treatment. Biotransformation of organic substance is carried out with a loss of about 35-40% of the substance. Then water appears, most of the water evaporates and the rest remains as a filtrate.

The process of decomposition of organic substances is carried out with aerobic microorganisms: $C_6H_{12}O_6 + 6O_2 = 6CO_2 + 6H_2O$ [3].

The amount of filtrate formed is minimal in aerobic treatment. Due to the fact that the optimum moisture content of the substrate for composting should not exceed 75%. Prior to heating the compostable substrate from this amount of moisture, the maximum amount of the filtrate can be released in the first composting step primarily mechanically due to the gravity of the stack formed. The main source of the formed filtrate is atmospheric precipitation, as well as the water needed to maintain optimum moisture.

When composting with forced aeration of the substrate, intensive oxidation of organic substances occurs, including the formation of water, carbon dioxide and ammonia.

The heat released during the oxidation of 1 kg of organic matter is enough to evaporate 5 kg of moisture, additional moisture is removed by natural evaporation [4].

The use of a climatic chamber makes it possible to accelerate the process of raising the temperature and its uniform redistribution over the thickness. It does not allow the drying of the substrate. Aeration and small excess pressure redistributes moisture and oxygen throughout the thickness. Part of the moisture and CO₂ escape into the atmosphere through the micropores of the climatic chamber material, the rest circulates in the volume.

This provides active microbiological processes and also involves evolved gases in the processes of humification and the synthesis of organic compost substances.

The main problem is solved by realizing this technology of effective composting due to full aeration, prevention of drying out, gradual loss of moisture through the pores of the material.

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**EVALUATION OF THE EFFICIENCY OF ASPIRATION
SYSTEMS OF VARIOUS TYPES IN THE PRODUCTION OF
CHAMOTTE, MULLITE, MULLITE-CORUNDUM PRODUCTS**

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Abstract: In Russia, in many enterprises, there is a practice of introducing control systems for gas-cleaning facilities with the possibility of their improvement and modernization, based on monitoring the quality of pollutant emissions.

Key words: air pollutants, gas-cleaning equipment, bag filter, aspiration system, purified gas (air), ball mills.

Introduction. The main environmental problems in the production of chamotte, mullite, mullite-corundum products are associated with waste gases generated by the operation of various types of furnaces and mills used for grinding of materials.

The article contains a description and analysis of technical methods for removing dust and gases generated during the operation of ball mills from the production premises of the workshop.

Methodology.

In the factory emissions, SO₂, NO₂, dust up to 20% SiO₂, N₂O, CO form the main volumes of pollutants.

To clean and neutralize pollutant emissions, special technologies, processes and devices for gas cleaning are used. The workshop is equipped with filters of different brands and producers: from outmoded SMC166B, FV, FB, FRKN, FRKI to modern FRIG, FRIP, CFE and FRI.

Because the operation of the gas-cleaning equipments is considered without leaks, a significant change in temperature and pressure, the purification rate is expected to vary insignificantly.

To compare the efficiency of filters of different types, aspiration installations from ball mills №2, №4, № 6 were chosen. The power of gas purification is determined by the formula:

$$\eta = 1 - \frac{C_o}{C_i} \quad (1)$$

C_i, C_o - concentration of pollutant per unit volume of dry gas respectively at the input and output from the apparatus, g / m³

The degree (efficiency) of purification is expressed in fractions of a unit or in percent

The metering of the concentration of pollutants in the cleaned gas were carried out in 2012-2016 in accordance with the annual plan-schedule for monitoring the state of aspirating systems.

Results of Calculations

The main function of the bag filter type SMC, used for ball mill №2, is to clean process gases (dry) from fine dust. Filter material is lavsan.

Bag filter with pulse blow-down type FRI, used for ball mill №4, is designed for air filtration from any finely dispersed dry non-sticky dust, the particle size of which reaches 5 mcm. The efficiency index of gas cleaning can reach 90-99%

Filter elements of the bag filter KFE, used for the ball mill №6, are in the cassettes of four units. However, according to the obtained data, it has a relatively low purification efficiency (tab.1).

Table 1. Characteristic of gas-cleaning systems.

		2012	2013	2014	2015	2016
Ball mill № 2, Bag filter SMC166B						
Pollutants concentration in the purified gas (air), g / m ³	input	5,142	5,589	0,815	5,124	19,569
	output	0,044	0,085	0,015	0,346	0,192
Efficiency, %		99,1%	98,5%	98,2%	93,2%	99,0%
Ball mill № 4, Bag filter FRI-90-03P						
Pollutants concentration in the purified gas (air), g / m ³	input	4,767	4,637	1,553	1,639	2,642
	output	0,048	0,039	0,046	0,042	0,064
Efficiency, %		99,0%	99,2%	97,0%	97,4%	97,6%

Ball mill № 6, Bag filter CFE 72						
Pollutants concentration in the purified gas (air), g / m ³	input	0,229	0,231	0,481	0,505	0,837
	output	0,036	0,035	0,037	0,037	0,075
Efficiency, %		84,3%	84,8%	92,3%	92,7%	91,0%

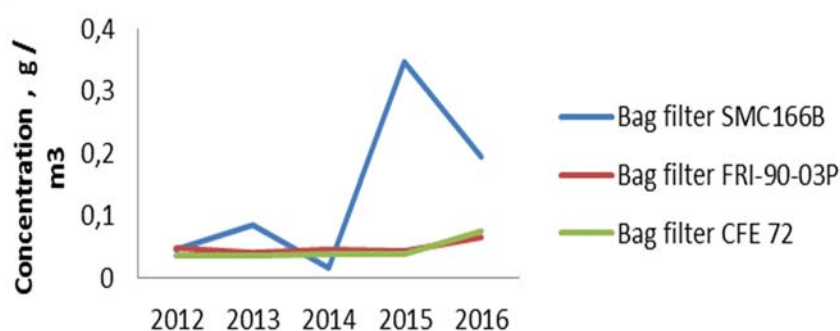


Figure 1. The concentration of pollutants in the cleaned gas (air) at the outlet.

Results and conclusion

According to the calculation results, the bag filters SMC 166B and FRI-90-03P are characterized by the best degree of purification. The efficiency of the bag filter KFE 72 is much lower. However, an important indicator is the concentration of pollutants in the cleaned gas at the outlet.

Weak item in the construction of filters SMC-166 are purging valves type SMV and control systems for the regeneration of bag filters, perhaps this can explain the instability of this filter in recent years. Also, the increased concentrations of pollutants at the outlet can be associated with an increased load on the filter.

In conclusion The efficiency of gas-cleaning equipment is affected by many factors, for different aspiration systems they can be completely different and it is not possible to consider them within the framework of this article.

In any case, irrespective of the type of filters, it is necessary to periodically assess the compliance of the construction parameters with actual ones, because it will help to identify and eliminate factors that affect the efficiency of gas-cleaning equipment.

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ENERGY CONSERVATION THROUGH THE OPTIMIZATION PROCESS OF BIOGAS FORMATION AT LANDFILLS MUNICIPAL SOLID WASTE

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Abstract: The article described the optimization of biogas formation at landfills municipal solid waste. To cover landfill bodies hermetically with a woven geocloth to isolate is the chosen method to catalyze process of anaerobic destruction of waste forming biogas, after a careful sorting of solid municipal waste. To maintain the average temperature of a landfill body means to provide a way out for biogas.

Key words: biogas, municipal solid waste, landfill.

A little more than 200 million cubic meters per year of the considered waste are formed in Russia. A part of waste is processed, and the rest is stored on solid waste landfills. And this size increases every year in the world [1].

Biogas is the result of destruction of organic part of waste and it can be used as an energy resource. The anaerobic fermentation of

biomass is carried out in the digesters. Digesters can be semi-buried or buried in soil depending on climatic conditions of the region. Installations for receiving biogas taking into account their productivity and volumes are subdivided into reactors for:

- small (1-20 cubic meters) and large (50-500 cubic meters) farms;
- processings of industrial drains of production of alcohols and sugar (0,5-10 thousand cubic meters);
- processings of solid wastes (1-20 million cubic meters).

Process of an anaerobic fermentation of organic part of waste is the basis for receiving biogas on solid waste landfills (see Table 1). Open solid waste landfills can be built in Russia. To control humidity of the stored waste is advantage of the covered grounds. It allows to reduce risk of increase in quantity and a modulation of a filtrate out of ground limits in the period of showers and to reduce emission of biogas in external environment [2]. The technology of collecting biogas has been introduced in Russia for the first time on Dashkovka and Kargashino solid waste landfills in January, 1994.

Table 1. Results of calculation of thermodynamic indicators of the main chemical reactions which proceed at the fourth stage of decomposition of waste

Thermodynamic yardsticks		$4\text{CO} + 2\text{H}_2\text{O} \rightarrow$ $\text{CH}_4 + 3\text{CO}_2$	$\text{CO}_2 + 4\text{H}_2 \rightarrow$ $\text{CH}_4 + 2\text{H}_2\text{O}$	$4\text{CH}_3\text{OH} \rightarrow$ $3\text{CH}_4 + \text{CO}_2 + 2\text{H}_2\text{O}$
Entropy, ($\Delta S_{x.p.}^0$), J/(mol · K)		-103,04	-409,32	406,24
Enthalpy, ($\Delta H_{x.p.}^0$), kJ/mol		-241,64	-253,00	-231,92
Gibbs energy, ($\Delta G_{x.p.}^0$), kJ/mol	T= 250,00 K	-215,88	-150,67	-333,48
	T= 260,00 K	-214,85	-146,58	-337,54
	T= 277,15 K	-213,08	-139,56	-344,51
	T= 290,00 K	-211,76	-134,30	-349,73
	T= 300,00 K	-210,73	-130,20	-353,79

Vertical wells use for collecting biogas. Diameter of wells makes 25-30 centimeters and they settle down at distance of 50-60 meters

from each other. Catching and transportation of biogas through the gas pipeline requires gas discharge. Discharge is carried out by means of the compressor. Then biogas arrives on the gas pipeline to motor-generators which make the electric power. The selection has been made of 17 methods of calculation of biogas emission on solid waste landfills as a result of the analysis of the published methodical works. Each of methods has the advantages and shortcomings.

We used two methods for calculation of the biogas emission:

1) calculation of quantitative characteristics of emissions of the polluting substances in the atmosphere from solid waste landfills and [4]

2) definition of potential amount of the biogas produced by a body of solid waste landfill [4].

The result of calculations of optimum quantity of an exit of biogas is in the fact that an exit of biogas decreases at increase in humidity. Emission of biogas increases at increase organic components in waste. Some reactions are given in the table, proceeding in a landfill body. Values of energy of Gibbs, enthalpy and entropy have been calculated on these reactions. The received sizes indicate that the first two reactions will probably better proceed at reduction of temperature. The probability of course will be higher in the third reaction at increase in temperature.

According to the results of the study the following recommendations were made up to optimize process of receiving biogas of landfill bodies: to isolate landfill bodies, that is to cover them most hermetically with a woven geocloth. It will allow to catalyze process of anaerobic destruction of waste and formation of biogas, to maintain humidity of a body of the ground at one level, to increase organic components of waste by careful sorting of solid municipal waste; to maintain the average temperature of a landfill body and by that to provide the biogas way out.

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**METHODOLOGY OF RESEARCH FOR QUALITATIVE
COMPOSITION OF MUNICIPAL SOLID WASTE TO SELECT
AN OPTIONAL METHOD OF RECYCLING**

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Abstract: The article offers research methodology for qualitative composition of municipal solid waste to select an optimal method of recycling. The resource potential of waste directly depends on its composition and determines effectiveness of using various techniques, including separation and separate collection of refuse. The decision on re-equipment of waste-separating enterprise, which decreases the supply of waste to the burial site and provides economy of non-renewable energy sources, is well-grounded, because it allows diminishing an anthropogenic load on environment.

Key words: recycling municipal solid waste (MSW), qualitative composition of consumer waste, solid fuel produced from consumer waste.

Introduction. The situation, which has developed recently in connection with steady annual growth in the amount of waste produced in Russia, brings to the start of irreversible process resulting in degradation of environment and creates real threat to health of population. The key point of our research is connected with the

necessity of taking immediate decisions for decrease in supply of MSW to the burial sites, taking into account available capacities of the waste-processing enterprises and the situation, when formation of litter is on the stable increase, but waste-processing industry is not sufficiently developed. The purpose of research is to decrease anthropogenic load on the environment at the expense of modernization and re-equipment of waste-processing enterprises. We offer the methodology of research for qualitative composition of solid waste, that allows choosing an optimal method of waste recycling. Also we offer the technology of complex processing for municipal solid waste and production of alternative fuel.

Theoretical value of this research is in offering of new research methodology for qualitative composition of solid waste to choose an optimal method of waste recycling.

Practical importance of project implementation: solutions of modernizing waste-processing enterprises, offered in this scientific paper, will allow to decrease anthropogenic load on the environment at the expense of decreasing waste supply to waste-processing enterprises and economizing on non-renewable sources of energy.

The paper offers methodology of research for qualitative composition of solid waste to choose an optimal technique of waste recycling; methodology is based on the analysis of several levels: morphological, fractional, power and chemical (fig.1).

Results of MSW composition study show, that consumer waste possesses high resource potential. More than 60 % of consumer waste volume is taken by energy fractions (cardboard, paper, wood, textiles, polymeric waste (fig. 1)), from which alternative renewable fuel can be produced.

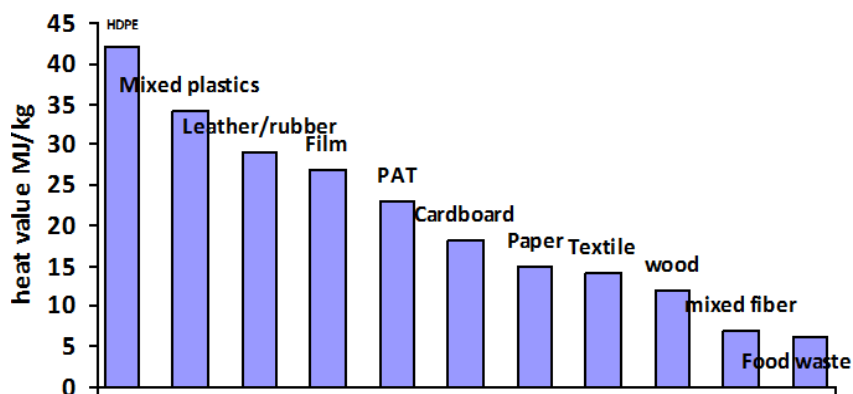


Fig. 1. Heat content of MSW components

On the basis of Russian technical standard GOST P 54236-2010 one can make a conclusion that for producing fuel from waste, the waste itself should possess high parameters of heat value.

Table 1. Comparison of MSW energy fraction with other kinds of fuel

Type of fuel	Heat value, MJ/kg	Humidity, %	Ash content, %
MSW Energy fraction	12-16	15-25	10-22
Brown coal	21-32	3-10	5-10
Composite MSW	11-12	30-40	25-35

Waste-recycling enterprise LLC "POVTOR " in the municipal district of Tolyatti in Russia gives an example of using methodology of qualitative composition of municipal solid waste.

On the basis of undertaken calculations one can make a conclusion, that in case of upgrading the enterprise LLC "POVTOR" with the purpose of producing solid fuel from MSW, this waste-separating enterprise will produce more than 14 000 tons/years of solid fuel. The scheme of disposing waste after carrying out upgrading of waste-recycling enterprise LLC "POVTOR " is presented in figure 3.

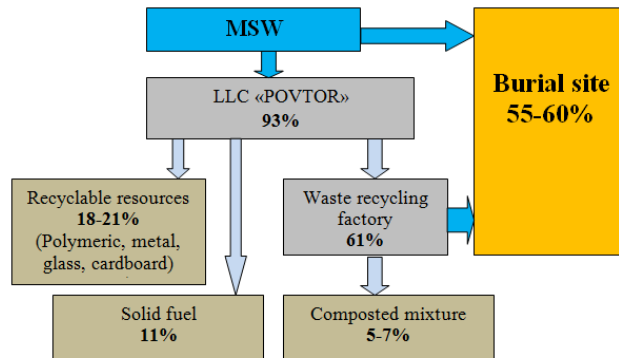


Fig. 3. The modernized system of disposing municipal solid waste in the municipal district of Tolyatti city

The quantity of the formed tailings will decrease from 110652 to 84 163 tons/year. At the same time the quantity of selected secondary material resources will increase from 14348 up to 26 760 ton/year.

Calculations of heat value for produced fuel allow to draw a conclusion that on the basis of heat value parameter, according to classification of solid fuel produced from consumer waste in accordance with Russian technical standard GOST P 54236-2010, quality of the solid fuel, produced as a result of recycling MSW on the upgraded conveyer of waste recycling in the enterprise LLC “POVTOR”, will raise in 4 points and will correspond to the 1st class of quality - that is the highest limit of RDF quality. Comparison of heat value of the produced fuel with brown coal (fig. 4) evidently proves expediency of using solid fuel, produced from MSW, as an additive to brown coal.

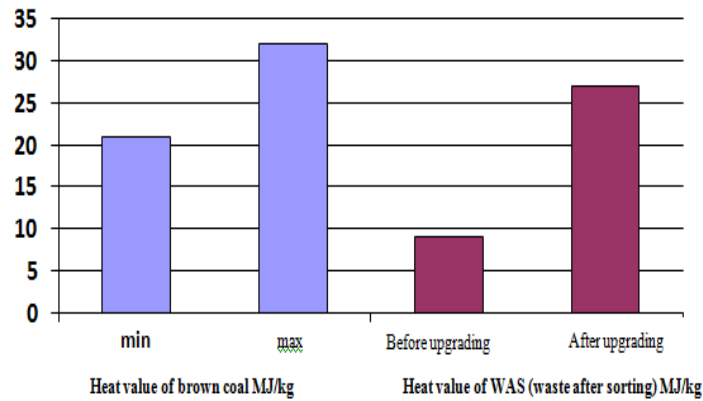


Fig. 4. Comparison of heat value of solid fuel made from MSW, produced by the upgraded MSW waste-recycling enterprise LLC "POVTOR", with brown coal

Economic calculations allow to make a conclusion, that upgrading waste sorting complex of the enterprise LLC "Povtor" to the status of a wholesale MSW recycling enterprise, producing solid fuel, will be repaid in 3 years and 8 months.

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ANALYSIS AND ASSESSMENT OF THE LIFE
CYCLE OF PRODUCTION OF THERMAL INSULATION
FROM MINERAL WOOL, FLAX AND EXPANDED
POLYSTYRENE USING GABI 6 SOFTWARE

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Abstract: The life cycle of construction materials includes all stages of production starting with raw materials, transport, material manufacturing and the installation in the built environment, subsequent operation, disposal or reuse. The production of construction material is the most significant in carbon accounting terms.

Key words: green building, life cycle assessment, thermal insulation, sustainable building materials, mineral wool, flax insulation, expanded polystyrene, carbon footprint, GABI 6

Introduction. The rational use of resources, energy efficiency, minimization of environmental impact, the creation of favorable microclimates in residential and commercial buildings are all major trends in the world construction market. Innovative construction materials play an increasingly important role in ensuring energy efficiency and environmental protection in buildings.

The objective of this research is to calculate a carbon footprint and to assess and compare the impact of the life cycle of production of insulation materials made from mineral wool, expanded polystyrene and flax on the environment.

Methodology. The purpose of a life cycle assessment (LCA) is to capture the impact of all production stages in an assessment relating to environmental impact, calculating equivalent CO₂ incorporated. The main categories of impacts on the environment are use of resources, human health and the natural environment.

Life Cycle assessment (LCA) includes four stages: 1.

Goal and Scope Definition

At this stage the aim, subject, limitations, main directions and procedures of carrying out an assessment of life cycle are defined [1, 2].

2. Life Cycle Inventory (LCI) – What's embedded in the product?

The inventory analysis includes data collection and calculation procedures for the purpose of quantitative definition of the corresponding input and output data flows from the production system.

A. Mineral wool

Mineral wool is one of the most widespread thermal insulators in the construction and other industries. It incorporates crushed mineral raw materials fastened with a binding.

B. Expanded polystyrene (EPS)

Manufacture includes introducing polystyrene "beads" into high-boiling liquids (an isopentane, dichloromethane and etc.) and subsequent heating.

C. Flax insulation

This type of insulation is made of flax fibers and represents a natural and environmentally neutral material. Bindings of polymer or starch are used similar to the structure of linen [6, 7].

A full evaluation of Linen would also compare its relative cost to the above findings.

Results of Calculations

For calculation of a carbon footprint of life cycle of insulation materials, processes were analyzed and models of production of insulators were created.

Diagrams 1-3 show models of production life cycles for insulation materials. The models do not extend to the production processes of raw materials, processing or subsequent utilization,

manufacture of binding and packing materials. On schemes blocks and arrows depict material and power streams.

On blocks are specified:

- capital Latin letters – the country in which parameters the carbon footprint is measured, in our case – the Russian Federation ("RU");
- the name of the process, for example "Foaming";
- color-coded in the right top corner the branch to which this process belongs is designated;

All blocks are connected by arrows showing the direction of the movement of streams of materials or energy. The thickness of the arrow indicates the amount of the material used in a stream. Units and descriptions are included.

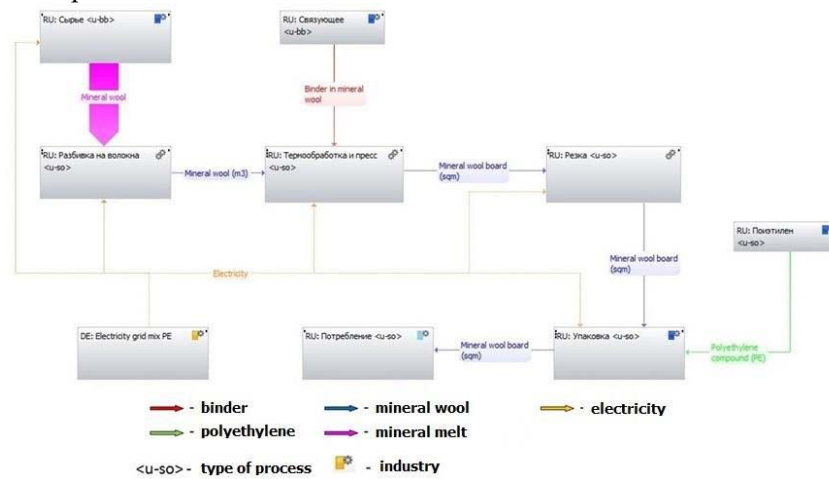


Figure 1. Model of life cycle of mineral wool production

The results of calculation of a carbon footprint received during modeling were used in the comparative schedule

Results and conclusion

After modeling production systems we calculated overall carbon footprints using GaBi 6 software. These are shown below (tab. 1, fig. 5).

Table 1. Emissions of greenhouse gases from the life cycle of production of 1 kg of insulation material (CO2 equivalent)

Insulation	Carbon footprint, kg. CO2 eq.
Mineral Wool	206,3
Flax insulation	101,3
Expanded polystyrene	96,2

Analysis shows that the maximum emission of greenhouse gases occurs by production of mineral wool (tab. 1). Emissions of greenhouse gases from the production of expanded polystyrene and a linen insulator are approximately the same level, with slightly lower results for expanded polystyrene (tab. 1).

In conclusion Flax and Expanded polystyrene contain similar carbon footprints, approximately twice that of mineral wool. The limitation of this result is that it does not show the rest of the life cycle either prior to manufacturing of the components or in or after use. The conclusions are largely subjective and not quantified at this stage. The relative costs of manufacture are not compared.

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WOOD PALLETS AND THEIR ROLE IN BIOENERGY IN ALGERIA

Algeria

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Abstract: As part of the ongoing research to replace fossil fuels, biomass represents the first to be the energy of tomorrow. Once dried and then compressed to reduce the moisture content and increase their calorific value, wood derivatives such as sawmill residues, wood powders and other chips can compete with fossil fuels by entering into the composition of fuels or by powering thermal power stations. While there is a very strong demand for biofuels Algeria, where the raw material exists in abundance, can be one of the players in this booming industry.

Key words: bioenergy, wood pellets, Algeria.

Introduction.

Forestry in Algeria accounts for 11% of the total area of the country. In this work we will try to evaluate and to highlight the potential of the production of the pellets from the wood after damages. Wood converted to bioenergy represents a renewable energy resource and a multi-billion-dollar market.

Material and methods.

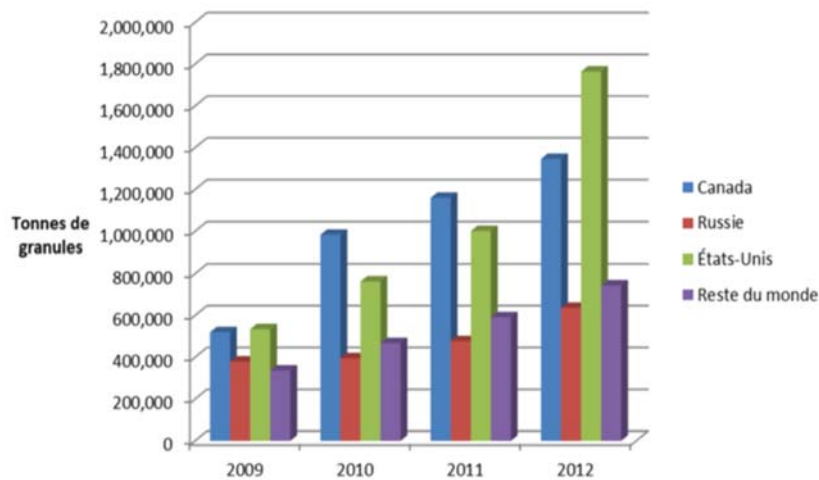
In addition to traditional cutting residues, Algeria has untapped biomass potential. The wood pellet, also known as pellet, is a small cylindrical stick of compacted fuel with cross section of 6 mm² or a diameter of 6 mm and a length of 10 to 30 mm. It is mainly derived from the compaction of sawmill residues such as sawdust and chips directly from forestry.

Recovering trees quickly after a natural disturbance, be it a fire or an epidemic of insects, makes it possible to preserve their physical and mechanical properties. The maintenance of these properties is limited in time: 1 to 2 years for lumber and 3 to 4 years for pulpwood. After these delays, the degree of degradation of the wood makes it generally unsuitable for the manufacture of these products. However, this wood remains, for several years, an adequate source of biomass for the production of energy.

Bioenergy therefore constitutes an interesting route of valorization for this fiber.

The present research has been based on Canada and the USA experience [3], as world leaders in pellet production. Quebec's forests are subject to natural disturbances that generate enormous volumes of unused wood. They are massively subsidizing the entire biomass supply chain, from plant construction to forest harvesting (Table 1).

Table 1. World wood pellets production leaders. Natural Resources Canada [4]



At equal efficiency per unit of energy produced, CO₂ emissions are higher for forest biomass than for fossil fuels. Organic matter contains less energy per unit of carbon than petroleum products and natural gas. If they are not used as fuel, cutting residues and industrial waste decompose in a few years and then emit CO₂ into the atmosphere. However, compared to fossil fuels, biomass can "repay"

this emission of greenhouse gases. When they come from a sustainable development, the burnt trees are replaced by a regeneration which gradually recaptures the CO₂ emitted. Once the CO₂ debt is reimbursed, the benefit to the atmosphere increases from year to year. However, the length of the repayment period for this debt varies greatly, depending on the type of biomass used.

Results. Mainly used as a source of energy for heating, wood pellets are also used for animal litter. The stove or pellet boiler can operate fully automatically through a mechanized fuel supply. Theoretically it is better to minimize emissions of volatile organic compounds (VOCs), tars and dioxins (compared to logs).

Storage is facilitated (compared to logs or wood chips) because the energy density of the pellets is high; pellets can be delivered by a suitable tanker or by pallets of 66 bags of about 15 kg (a total of about one ton).

Time to repay carbon debt, by biomass sources:

- Less than 10 years: post-consumer residues, industrial residues, cutting residues that decompose rapidly and biomass from short-rotation plantations.

- Between 10 and 20 years: wood recovered from natural disturbances, stumps and stems of good diameter of non-commercial species left on cutting grounds.

- From several decades to a century: green trees on foot.

EU member countries will have to include 20% renewable energy in their energy portfolio by 2020. This is a market estimated at over 50 million tons!

Conclusion.

The main issues surrounding the harvesting of forest biomass are biodiversity, water and riparian areas, soil productivity, and carbon footprint. The harvesting of forest biomass for energy purposes is generally not problematic, at least in the short and medium term. However, knowledge is still imperfect about the impact of using recovered wood after a disturbance, so research is underway.

From the year 2000 that the wood pellets become an alternative to oil. Despite the negative impact of fires on the environment, woods after disturbance represent an important potential for producing bioenergy, cutting residues being a serious solution for limiting fire, but also using wood from forests to produce green energy.

A European market will explode the production of energy from wood fiber, especially the Scandinavian countries.

The production of granules is absent in Algeria despite the geographical advantage to be close to Europe, but it is always necessary to count the economic and ecological gain to initiate an investment policy in this area.

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DIE ABFÄLLE UND DES KONSUMS UND IHRE REALISIERUNG IN RUSSLAND

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Abstract: The article is dedicated to the problem of waste and its utilization in Russia. The decline in production has led companies to save on conservation costs due to economic crisis conditions.

Stichwörter: die Abfälle, die Abfälle des Konsums, die giftigen Abfälle, die Verwertung des Mülls.

Die Einleitung

Die Aktualität der vorliegenden Arbeit besteht darin, dass jedes Jahr die Anzahl vorwiegend der giftigen Abfälle zunimmt. All das ist

für die Umwelt sehr gefährlich. Mehrere davon sind sehr schädlich und stellen eine große Bedrohung für den Menschen dar.

Das Ziel der vorliegenden Arbeit, den Einfluss der Mülldeponien auf die Umwelt zu zeugen.

Die Aufgabe besteht in der Wahl der effizientesten Mittel der Abfallverwendung.

Das Problem der Abfallvermarktung in Russland steht auf dem Vordergrund. Monatlich vergrößert sich die Anzahl der gefährlichen und schädlichen Abfälle. Dadurch verwandeln sich die Städte und Ihre Umgebungen in einen Müllhaufen. Schädliche Paare werden vom Wind auf das ganze Territorium der Städte verweht, deshalb erhöhen sich die Fälle der gefährlichen Erkrankungen.

Die Abfälle und der Konsument

Der Hauptgrund des ungünstigen Einflusses auf die Umwelt ist nicht die Größe der Unternehmen sondern Mangel an Überarbeitung von Bodenschätzen, sowie die Überarbeitung von Abfällen.

Die Abfälle sind die Reste des Rohstoffes, der Materialien, der Halbfabrikate, der chemischen Verbindungen, die bei der Herstellung oder der Ausführung der Arbeiten entstanden, die vollständig oder teilweise ihre Ausgangskonsumeigenschaften verloren.

Das Problem der Erhöhung des Gebrauches von Abfällen besteht nicht nur in ihrem negativen Einfluss auf die Umgebung, sondern auch als wertvoller Rohstoff.

Die Abfälle des Konsums sind Stoffe, die die Konsumeigenschaften infolge physischen oder moralischen Verschleiß verloren.

Die Abfälle des Konsums sind materielle Ressourcen, die können noch einmal, in der Volkswirtschaft verwendet werden.

Die Abfälle können sowohl giftig als auch gefährlich sein. Die giftigen und gefährlichen Abfälle, die enthalten oder von derartigen Materialien verschmutzt sind, sind in solcher Konzentrationen, dass sie potentielle Gefahr für die Gesundheit des Menschen oder der Umwelt darstellen.

Die Überarbeitung und die Verwertung des Mülls

Die Wiederverwertung des Mülls ist ein ernstes Problem, das Russland berührt. Der Müll kann nützlich sein, es ist jener Müll, der verwendbar ist, aber wir denken selten daran. Der verwendbare Müll ist das Altpapier - verschiedene Arten der Papiere und der Pappe; die

Glasflaschen; die Aluminiumdosen; die Textilwaren; verschiedene Arten des Plastikstoffes; die Nahrungsabfälle und die, die man zur Düngemittelproduktion verwenden kann.

Die verbreitetsten Maßnahmen nach der Liquidation der Haushaltsabfälle: das Verbrennen und Begräbnis.

Die Abfallverwendung in Russland ist ein sehr scharfes Problem, deren Lösung nur beim richtigen Herangehen an sie möglich ist. Laut der Statistik ist 40 % des ganzen Mülls ein wertvoller Sekundärrohstoff, den man ins weitere Produkt verarbeiten kann. Leider nur von 7 bis 8 % aller Abfälle wird wiederverarbeitet, der übriggebliebene Müll wird abtransportiert und verbrennen oder auf Deponien gelagert. In Russland fehlen die Betriebe, die den ganzen Zyklus der Abfallentsorgung von der Sortierung bis zum Endprodukt verwirklichen würden. Die Abfallentsorgung ist ein sehr gewinnbringendes Business, weil die Nachfrage heute nach dem Sekundärrohstoff sehr hoch ist.

Die Schlussfolgerungen

Leider ist die Abfallentsorgung in Russland noch nicht entwickelt, wie in Europa und sowohl die ökologischen Forderungen bei uns niedriger sind, als auch die Kontrolle für die Verwirklichung dieser Forderungen. Die Entwicklung des Zweiges ohne Heranziehung der staatlichen und privaten Mittel ist unmöglich. Die Veränderungen in der Gesetzgebung könnten die vorliegende Situation positiv beeinflussen und Veränderungen hervorrufen.

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**POTENTIAL IMPACT OF PLACTIC PROCESSING
ENTERPRISES ON THE ENVIRONMENT**

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Abstract: Nowadays plastic processing enterprises generate production and consumption waste of 1-5 classes of hazard. The purpose of this article is to demonstrate potential impact of waste and wastewater from plastic processing enterprises on the environment.

Key words: waste, wastewater, pollutants, plastic, environment, recycling industry, reagents.

Nowadays the recycling of plastic is one of the most important areas for the rational use of resources. In the modern world, plastic is used everywhere, that leads to the formation of a huge amount of waste. In this connection, there is a need to recycle this type of garbage. Recycled plastic is a raw material for such goods as T-shirts, vests, blankets, pillows, packing tape, toys, etc. However, this process does not exclude a negative impact on the environment, because some waste is formed during the process of plastic recycling, and wastewater contains polluting substances.

The activities of plastic processing enterprises are related to the formation of production and consumption waste of 1-5 classes of hazard for the environment. The main waste of production is sludge. Sludge (from Schlamm - mud) is waste products that made up of dust and petty parts obtained as a deposit during the process of washing a material. Since sludge contains reagents involved in the production process (that is, when the sludge barn is not properly regulated (e.g., no drainage ditches, waterproofing barns, etc.), they sleep in soils, underground and surface water. The composition of these reagents depends on the composition of the detergent used. The main substances that make up the detergent for plastic bottles are sodium triphosphate (Na₅P₃O₁₀), caustic soda (NaOH), labomide-203 (50% soda calcined,

30% sodium tripolyphosphate, 10% sodium metasilicate, 8% synthanol DS-10, 2% alkyl sulfates) [1].

As for sodium triphosphate, it used to be applied in large quantities as a softener. But since it turned out that the substance has a negative impact on the environment, many European companies decided to remove it from their productions. This is due to the fact that when this salt hits the water bodies, the bogging process accelerates, which results in disturbed biological equilibrium. It was decided to replace Sodium triphosphate with other active agents, such as polycarboxylate, zeolite, sodium carbonate. These substances are less dangerous for the environment. As for sodium tripolyphosphate, this salt has a similar effect on the natural environment. For example, 1 gram of sodium tripolyphosphate stimulates the formation of up to 10 kilograms of algae. This significantly increases the amount of plankton [1].

Calcined soda, sodium metasilicate and synthanol DS-10, which are part of the detergent lambomid-203, are moderately hazardous compounds, which can cause burns if they get on the skin and mucous membranes. Accordingly, it is necessary to avoid getting these compounds into the natural environment, especially in water bodies.

Also during the production process such components as suspended solids, ammonium nitrogen, nitrates, petroleum products, iron and non-ionic synthetic surfactants fall into the waste water. Often the concentration of these substances in wastewater exceeds the maximum allowable values [2].

All these ecotoxicants can get into the environment due to deficiencies in the drainage system. It can also be affected by the human factor and possible emergency or unforeseen situations in the enterprise. If the norms for arranging landfills where raw materials and waste are kept are not met, many pollutants can get into the soil and the groundwater [3].

In the process of production, the following wastes are formed:

- household garbage (mercury lamps, garbage from household premises, etc.)
- ferrous scrap of unsorted
- used industrial waste oils
- acid rechargeable sulfuric waste
- wiping material contaminated with oils (oils less than 15%)

- accumulated leaded lead batteries, with drained electrolyte
- shavings of ferrous metals uncontaminated
- formation of polypropylene waste in the form of a film
- formation of waste (sediments) during mechanical wastewater treatment
- formation of polyethylene in the form of a film
- lubricating and cooling oils for mechanical processing
- waste of uncontaminated cardboard
- used hydraulic oils, etc. [4].

Of the listed wastes, mercury-containing lamps and lead-acid batteries belong to the first and second hazard classes. The third class of hazard includes all types of used oils. The fourth class of hazard includes waste glass, plastic packaging and etc. While the fifth class of danger includes cellulose products [5].

The ingress of waste from the first two classes of hazard into the environment can cause inhibition of cellular respiration in plants, a decrease in enzymatic activity and other consequences. As for the fauna, these wastes can cause depression of important vital and reproductive functions. There is also a decrease in the viability of offspring in animals. For a person these wastes are also dangerous as they can damage the central nervous system, visual and hearing impairment, muscle disorders and other negative consequences [5].

Thus, recycling industry requires modernization of the production process by introducing the latest available technologies, to reduce the amount and hazard of waste. It is also necessary to improve the skills of workers at enterprises and organize environmental audits for employees. Regular supervision of wastewater, collection and transportation of wastes is recommended. These changes will not only minimize the impact on the environment, but also increase the competitiveness of the enterprise in the market.

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AUTO RECYCLING RECENT TRENDS, OPPORTUNITIES AND CHALLENGES

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Abstract: The automobile is the single most recycled consumer product in the United States. Currently, almost 100 percent of automobiles get recycled in the United States. The US automotive recycling industry is a crucial, market-driven industry with over \$32 billion in annual sales. The industry employs more than 140,000 people at over 9000 locations across the country.

Key words: Auto Recycling, End of Life Vehicles (ELV), junk cars.

1. Recent Auto Recycling Trends

People with junk cars take them directly to a scrap auto business or trade them in at an automobile dealership, but eventually, they end up at an auto wrecker for recycling. At the wrecking yard, all the reusable parts of a vehicle, including wheels, windows, trunk lids, hoods, seats, and doors are removed. At the same time, for

environmentally responsible recycling, mercury switches are removed, and cars are drained of fluids.

The remaining hulk of the car enters the shredder. Then, it gets ripped into fist-sized chunks of nonferrous metals, steel, and fluffs (non-recyclable plastics, glass, rubber, etc.)². The steel and iron are magnetically separated from other contents and recycled. Then, the metal scrap is shipped to steel mills where it is used to produce new steel. Some metal scrap goes to secondary processors (often scrap brokers) as well.

Every year, more than 18 million tons of steel from automobiles are recycled by the steel industry.¹

Approximately, 86 percent of a car's material content is recycled, reused or used for energy recovery. About 60 percent of a passenger vehicle consists of steel and iron. The steel used to make a brand new car contains at least 25 percent of recycled content³. Recycled steel from old car is used to make car shell, hood, trunk, door and quarter panels.

2. Opportunities in Auto Recycling Industry

The auto recycling industry is a vast industry with high demand for End of Life Vehicles (ELV) in both auto manufacturing and steel industry. The CEO of the Automotive Recyclers Association (ARA), Michael E. Wilson, believes the opportunities for and the importance of the automotive recycling industry are both growing exponentially. These days, junk car owners have multiple options of selling their junk cars for cash. They can sell their junk cars on Craigslist, eBay and also directly to scrap yards and automobile dealers. At the same time, scrap yards and automobile dealers compete for EOL vehicles offered on Craigslist, eBay or directly from junk car owners. Businesses need to ensure they are equipped with latest technologies in the industry and maintain standards of auto recycling practices specified by ARA.

3. Challenges in Auto Recycling

The auto recycling industry is not devoid of challenges. Businesses need to ensure they are equipped with latest technologies in the industry and maintain standards of auto recycling practices specified by ARA.

Three of the biggest challenges for the sector include education and training, insurance, and salvage.

It is always hard to find good, skilled labor for an auto recycling facility. So, businesses need to hire new labor and train them for a long time to make them competent in the field. Until and unless the company has a well trained and skilled labor force, the overall efficiency will be diminished. Insurance is another significant challenge as the number of businesses that provide workers' comp insurance in the industry is low at the moment. Finding reasonably priced salvaged vehicle is another challenge for firms in the sector, as many old cars are exported while more are purchased by unscrupulous buyers who will pay almost anything to get them.

4. Junk Car Medics- An Example of the Customer-Centric Auto Recycling Trend

Increasingly, auto recyclers are employing more sophisticated marketing and customer service approaches to improve their inflow of old vehicles.

Such methods are designed to make it very easy for owners to get cash for their clunkers and have them quickly take away.

Junk Car Medics is a company that has created a national brand, operating in more than 53 locations across the United States. Medics work with auto salvage yards across the country. The company buys junk cars for cash, process them and sell steel, nonferrous metals and other contents to steel mills and manufacturing businesses that can use them to produce new products. In the process, the reusable car parts get separated and sold to automotive repair centers.

There is a Cash For Junk Car Form on their website which needs to be filled and submitted to get an offer for any junk car a customer may have. Once the form is filled and submitted, Medics contact the client right away and make an offer for the junk car. Once the customer accepts the offer, Medics dispatch a tow truck to deliver the customer the cash for the junk car and provide free junk removal. Junk car owners can also make a direct call to Medics and get a quote for their vehicles.

As the industry moves towards higher levels of customer service and greater ease of recycling, this approach assures more efficient recycling and resource recovery.¹

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THE PROSPECTS FOR RECYCLING PLASTIC WASTE

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Abstract: Currently, polymer materials are widely used in various industries, ranging from the production of consumer goods and to building constructions. Therefore, recycling is becoming increasingly important.

Key words: polymer, plastic, waste, recycling, processing of plastics.

Introduction. Annually on average in Russia formed about 5 billion tons of waste, of which 3.5 million tons of accounted for polymer waste. The main methods of plastic recycling are dumping, incineration and recycling, although according to experts is processed, only 13% of plastic waste [1].

Why is it so important and promising exactly recycling plastics? Firstly, in July 2017, the Government of the Russian Federation was approved "List of production and consumption wastes composed of useful components, which is prohibited". According to this document, on the 1st of January 2019, the ban on the dumping of product waste, which is made by plastic will come into force [2]. Secondly, polymer waste decomposes badly or not able to do it at all, in other words, they primarily need to be recycled. Thirdly, polymer waste is a powerful raw

material and energy resource in conditions of polymer raw material shortage.

Materials. Polystyrene recycling has not yet received such a wide spread as other recycling large polymers such as polyethyleneterephthalate. The main reason for this was the slight difference in the cost of primary and secondary raw materials.

However, in recent years, the situation with recycling of polystyrene has improved somewhat as a result of increasing the difference in cost. This was due to a series of programs whose purpose is to stimulate companies to implement recycling of polystyrene. Generally now gaining popularity in the recycling of expanded polystyrene. This is because in the technology of recycling expanded polystyrene solves a number of specific technological problems and challenges.

Methods. We analyses a relatively new method of recycling when polystyrene is dissolved in the biodegradable d-limonene solvent produced from the peel of citrus fruit plants. Spraying the solvent on the surface of the expanded polystyrene the polymer turns into a gel substance. The density of the obtained gel is several times higher than the density of the expanded polymer. Using d-limonene one can easily dissolve the expanded polystyrene, the material is almost not subjected to degradation and its performance remains almost unchanged [3]. The use of this solvent can significantly increase the efficiency of polystyrene waste transporting, as much more treated polymer enters a truck compared with the initial expanded polystyrene.

Polystyrene waste can be additionally purified by filtering the gel through a series of screens and filters, not only non-dissolved particles of contaminants, but other polymers can be removed. Passing the stage of filtration of the gel, cleaned polystyrene may be deposited from solution by adding a second solvent to the mixture. Further separation of ternary mixture is done with the aid of centrifugation. Then residues are removed from the resulting gas. Recycling packaging with the use of d-limonene includes recycling of food waste and compounds of plant origin disposed in landfills. Such a possibility is provided thanks to the biodegradable nature of the used solvent [4].

Results. The advantages of using d-limonene as a solvent are as follows:

1) the solvent is completely harmless and not considered a volatile organic compound because d-limonene is a natural solvent;

2) because the dissolution and the evaporation of the solvent the material is not exposed to thermal influence, the result is almost no process of degradation of polystyrene and changes its physical characteristics;

3) as a result of dissolution and compaction of expanded polystyrene net material is reduced approximately 25 times, which significantly reduces the cost of transporting the material to the plant, which will be recycling;

4) d-limonene can be used repeatedly;

5) because expanded polystyrene is dissolved by simple impregnation it by d-limonene, for the processing of material requires a minimum amount of energy.

Conclusions. Waste is not only a source of negative impact on the environment and man, but also a source of continuously updated raw material and fuel and energy resources. Recycling of plastics will significantly reduce the area of land at disposal and temporary placement of waste. It is important that the most part of plastic waste is suitable for secondary recycling without any essential loss of properties reducing the number of non-utilized plastic not only in percentage, but also the weight.

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ENVIRONMENTAL ASPECTS OF WIND ENERGY USE

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Abstract: Renewable energy use is one of the ways to combat climate change and prevent ecological disasters. Renewable energy sources include wind farms, which have a number of advantages, but like any other method of energy generation they also have drawbacks.

Keywords: power engineering, wind energy, renewable energy, environmental protection

Introduction. Mankind has been using wind energy for a long period of time; such constructions as windmills and wind turbines can give a striking example for proving it. In the 30-s of the past century millions of wind generators with a capacity of approximately 1 kW were used in rural areas of Europe, America and Asia [1]. With the development of main water supply lines, the demand for wind energy decreased, but with the rising prices of fossil fuels and awareness of its environmental implications the hopes of many researchers are again connected with wind energy.

Wind potential is huge – the power of wind currents in the atmosphere is about 2 000 TWh [1]. This type of energy does not consume fossil fuel, uses no water and does not pollute the environment. But even these positive aspects of wind energy use have a wide range of negative environmental impacts.

Main Part. In this article, the main disadvantages of wind energy generation are considered.

First of all, that is the low energy flux density, which forces manufacturers to use large areas for energy units' installation and the instability of energy generation in time [2]. The average speed of wind turbines ranges from 5 to 15 meters per second [1]. If the wind speed does not match the range, that is, the wind speed is too low, it significantly reduces the efficiency of the power plant. Otherwise, if the speed exceeds this range, it may cause damage to the installation. So

high requirements for power units designing are set; however, improving their quality and sustainability leads to higher costs.

Moreover, infrasonic radiation generated by the rotating blades of wind turbines is transferred to the soil and causes a harmful effect on living organisms [3]. In addition, wind turbines can have a significant effect on radio and television. As the blade speed is close to the synchronization television frequency of several countries, the operation of wind turbines creates TV interference within a radius of 1-2 km [1].

Due to the fact that the wind speed must not be less than 5 meters per second for wind turbine operation, most wind farms are located in high wind areas – mountain ranges and sea coasts. In Belgium it was found that a large number of wind turbines cause disruption of stability of the field ecosystems [1]. Thus, modulation of the wind flow blades creates semblance of regular structures in the air which interfere with the orientation of insects, and this is followed by crop yield decrease [1]. In addition, the rotation of the blades of wind generators is fatal to birds and as a consequence it leads to mass deaths of birds.

Also, wind power requires large areas for energy units' installation. Therefore, wind turbines are mostly located in deserted areas, and it causes an increase in the cost of energy transmission.

Conclusion. Despite the mentioned above factors, the problem of wind energy use remains relevant. Nowadays, the world is on the stage of implementation of new discoveries in the field of wind energy. To solve such problems like interference and infrasonic radiation, it is recommended to install wind generators at certain distances from settlements and the routes of television and radio broadcasts. To prevent the death of birds and the disorientation of insects, wind farms should be placed away from feed zones of species (for example, from the harvest fields), and also the operation of the blades during bird flights should be temporarily suspended.

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**POSSIBILITY OF INTRODUCING RESOURCE-SAVING
TECHNOLOGIES IN THE LIFE CYCLE OF LUBRICANTS**

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Abstract: The article conducted a comparative analysis of description and development of the market of lubricants in modern conditions. Results of comparison of the positive and negative aspects that exist at present. The conclusion States presented methods to improve market.

Key words: lubricants, petroleum, ecological situation, monitoring, processing, oils.

Introduction. The research is devoted to the analysis of theory and practice of rational use of secondary hydrocarbon resources on the territory of Russia based on the innovative theory and practice of oil waste recycling.

The issue of optimization and effective management of the rational use of secondary hydrocarbon resources on the territory of Russia, the allocation in existing streams of industrial waste of processed oil products subject to recycling, is relevant and it determines the choice of the research topic.

The research concerns one of the great dimensions of optimization and effective management of Russian natural resources.

Petroleum products are materials derived from crude oil as it is processed in oil refineries. Unlike petrochemicals, which are a collection of well-defined usually pure chemical compounds, petroleum products are complex mixtures. Waste and wastes are unwanted or unusable materials. Waste is any substance which is discarded after primary use, or it is worthless, defective and of no use. Lubricating materials are called such materials, which help reduce the frictional force and prevent wear of rubbing surfaces, as well as increase the load

capacity of the mechanisms. This resource has become widespread in modern production, as it significantly reduces friction in moving mechanisms, and reduces friction during machining of various materials on machine tools.

A number of researchers have recently calculated that the amount of lubricants used in the Russian Federation, including base oils, in 2015 was 3.2 million tons, which is 13% more than in 2011 (2.8 million tons). At the same time, requirement decreased by 6% - from 1.6 million tons to 1.5 million tons. The consumption of lubricants depends on a number of financial and technical conditions.

The legislation in force in foreign countries dealing with the management of used oils varies, but there is a uniform focus on the organization and creation of infrastructure for collection of used hydrocarbons for further processing with the aim of obtaining commercial oils, which then start a new life and are in use again.

It would be good to mention here that the transition to a "green" economy at the level of state regulation should go through encouraging technological progress when implementing resource-saving technologies.

Methodology. To return to main topic of this research it would be good to mention here purposes of secondary processing of used oils in the Russian Federation: processing of used engine oils and other types of lubricants; removal of impurities and additives, production of base oils of quality close to the original; Recovery of characteristics such as viscosity, flash point, color and others in order to achieve the level of quality of Group II base oils.

Most scientists will tell you that the term "resource-saving technology" means a special organization of production, during which the generation of waste is minimal and they are used as secondary resources. Usually the use of such technologies creates technological schemes with closed energy and material flows.

It should be mentioned that according to ISO 9004-1, the life cycle of product is a set of procedures, implemented from the onset of the necessities of society in some products to the slaking of the necessities and the destruction of the product.

It is necessary to point out that in the course of a closed life cycle of products raises a number of problems. Cycle under the influence of some factors can "burst".

Recent studies like these shed new light on problem of unexpected equipment failure. To prevent unexpected equipment breakdown, the production of low-quality oil specialists determined that it is necessary to introduce a monitoring system for oils in the production. Oil condition monitoring is a term for a set of test methods that reflect information about the mechanical state of a lubricating system.

The advantages of using the monitoring system are reduced maintenance; decrease in cost; longer service life of the system; increase of serviceability; improved security.

With the help of adsorption purification of petroleum products ensures the improvement of raw material properties and their performance characteristics.

With the help of adsorption purification, aromatic hydrocarbons and their derivatives, nitrogen-, sulfur-, oxygen-containing compounds are removed. Currently, it is very common to use bauxites, clays, zeolites as adsorbents as well as other substances, for example, silica gels and activated carbons.

Although adsorption purification may seem trivial, it is in fact crucial in terms of today's concern over recycling.

Results. A number of different systems have been implemented to collect recyclates from the general waste stream. These systems lie along the spectrum of trade-off between public convenience and government ease and expense.

At one end of the spectrum is mixed waste collection, in which all recyclates are collected mixed in with the rest of the waste, and the desired material is then sorted out and cleaned at a central sorting facility.

A lot of recyclable waste collected like this is too soiled to be reprocessed, but this way of disposal has advantages as well: the city need not pay for a separate collection of recyclates and no public education is needed.

In a commingled or single-stream system, all recyclables for collection are mixed but kept separate from other waste. This greatly reduces the need for post-collection cleaning but does require public education on what materials are recyclable.

In conclusion. Discussion of this topic is in fact addressing the larger matter of recycling lubricant waste. For the regeneration of spent

fuel, various technologies and processes are used that are characterized in the processing of raw materials for cleaning and removal of contamination products from the oil. The usual sequence of cleaning methods is the following: mechanical cleaning - removing solid contaminants, thermal cleaning - evaporation, distillation, physico-chemical cleaning - adsorption. For a higher cleaning, you can also use chemical cleaning. However, its application is associated with the use of technically complex equipment and significant costs.

Nevertheless, new research shows that there are many methods of oil regeneration, which use a variety of facilities, which allows you to restore oils from different manufacturers with different levels of lowering the quality indicators.

It should be noted that the described technology of regenerating properties of used oil is proposed for plants that use in work industrial, transformer, motor and oils of other kinds. Collection of used oils is carried out immediately at the place of education, namely, at enterprises, at consumers, at collection points.

The product, ready for reuse, after regeneration has the form: oil, corresponding to the initial quality with a set of additives (engine oils of different brands); base foundation of oils; oil, corresponding to the initial quality (energy, hydraulic, industrial oils of different brands); base foundation of industrial, power, hydraulic oils; fuel base consisting of a mixture of used oil products.

To sum up as a result of the analysis of the life cycle of waste paper, the following conclusions can be drawn: it is established that the life cycle of oils can be "closed", because with the help of resource-saving technologies it is possible to reuse used oil; It is revealed that the degree and quality of oil regeneration can be improved by using the latest technologies.

It becomes obvious that the best technologies with the help of which the restoration of lubricants takes place are namely the monitoring of the state of the oils, adsorption purification, and the technology of regeneration of used oils.

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LEGAL AND ECONOMIC FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

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TO THE QUESTION OF THE EFFICIENT USE OF LAND RESOURCES IN THE WORLD

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Abstract: The question of the efficient use of land resources is very acute as it results in sustainable development of agriculture in the world. In this paper, we consider several mechanisms of increasing efficiency of natural resource use.

Key words: land resources, agricultural land use planning, sustainable development, resource efficiency, agriculture, food safety, greening, economy, globalization.

Introduction. Rational use and conservation of land resources is the basis of sustainable development of agriculture and food security in different countries. Currently, crop production occupies more than 1.5 billion hectares, i.e. about 12% of the land area in the world. While much of the land area is potentially suitable for agriculture, most of it is covered with forests. About 90% of agricultural land is in Latin America and Africa south of the Sahara. On the other hand, there are almost no opportunities for the expansion of agriculture in South Asia, West Asia and North Africa.

Methodology. In this paper, we study several mechanisms of increasing efficiency of natural resource use, such as:

- improving forest management;
- expansion of protected areas rich in biodiversity, to protect them from being used in agriculture or any other means;
- increasing crop yields;
- changing dietary preferences in favor of less resource-intensive food, i.e. decline in the consumption of food of animal origin (meat).

In the literature there are numerous data on how you can steadily increase the yield of agricultural crops and ensure the growth of the

food in the world. In most of these studies special attention is paid to developing countries. Solutions are mainly associated with the introduction of new (high-yielding or more resistant) varieties of plants or breeds of farm animals, methods to improve the efficient use of water and nutrients, maintaining soil fertility and methods of combating pests and weeds. In most cases, their implementation does not require advanced technology.

The main reasons why in real life it is so hard to achieve improvements are as follows:

- new tools and methods should be widely applied, tested and adapted to local conditions before they are used by farmers;
- sustainable increase of profitability usually requires changes of production systems that are unattractive, difficult or impossible to implement by individual farmers in the current social, institutional, infrastructural and political conditions.

To address such issues requires an integrated approach and close involvement of different stakeholders at local level and at national, regional and international levels.

Results and conclusion.

- In the absence of significant efforts to improve the efficiency of resource use, agriculture is projected to expand rapidly in developing countries. A large part of the extensive expansion will occur in Africa, especially until 2030, which will lead to a significant loss of biodiversity.

- In most developed regions, agricultural production will gradually decline after 2020, however, in general, terrestrial biodiversity will decline steadily as a result of ongoing exploitation of forests and climate change.

- Global efforts to improve the efficiency of agricultural production, consumption, and food supplies can reduce agricultural expansion in developing regions by half in the period from 2010 to 2050, and to stop the extension after 2040. However, these efforts are insufficient to stop the increasing pressure on land resources and biodiversity loss unless other negative factors are eliminated.

- If the management is carried out properly, the expansion of forest plantations in the framework of the strategy of increasing the efficiency of resource use can have long-term positive impact on land

resources and global biodiversity, but the effect will be negative in the short term.

In conclusion. The efficiency of land use is the basis of sustainable land use because it contributes to food security. We need a concrete policy in order to avoid an overly strong focus on short-term efficiency of the market resources and to eliminate the consequences of the inevitable negative external factors that can endanger sustainability in the long term.

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AKTUELLE ANSÄTZE ZU KLASSIFIKATIONSSYSTEMEN DER ABFÄLLE

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Abstract: Analytical study of Russian and European waste management systems based on orders from the ministries of the Russian Federation and directives of the European Union.

Stichwörter: Abfallbeseitigung, Abfallbeseitigung, Bundesklassifikation des Abfallkatalogs, Abfallklassifizierung, Abfallmanagementsystem.

Moderne Behandlung mit Abfällen hat in sich eine Vielzahl von Verfahren, indem es mit der Bildung von Abfällen im Unternehmen beginnt und mit ihrer Abfallbeseitigung beendet. Es gibt verschiedene Dokumente und Abfallmanagement-Systeme, um die Richtigkeit der gesetzgebenden Organisationen zu überwachen. Für die Russische Föderation ist es die Bundesklassifikation des Abfallkatalogs (FCCC), für die Europäische Union - der Europäische Abfallkatalog (ECO). Derzeit ist die Definition der Abfallarten in der Russischen Föderation und der EU kompliziert und zweideutig. Dementsprechend ist es dringend nötig, Abfallrechnungssystem sorgfältig zu erlernen und kontinuierlich zu verbessern.

Der Zweck dieser Arbeit ist eine vergleichende Analyse von Abfallklassifizierungssystemen in der Russischen Föderation und in der Europäischen Union. Im Zusammenhang mit dem beabsichtigten Zweck wurden folgende Aufgaben erarbeitet: das System der Abfallklassifizierung in der Russischen Föderation und in der EU analysieren; Vorteile und Nachteile zeigen; Empfehlungen für Verbesserungen oder Änderungen in dem Abfallklassifizierungssystem in der Russischen Föderation und in der EU erarbeiten.

Es wurden die Vor- und Nachteile von Abfallklassifizierungssystemen in der EU und im Russland untersucht. Das Untersuchungsobjekt waren der Klassifizierungssysteme von Abfällen in der Russischen Föderation und in der EU [1]. Die Analyse der RF- und EU-Abfallklassifizierungssysteme wurde nach methodischen Prinzipien und vergleichenden Analysemethoden durchgeführt.

Durch Vergleich und Auswertung der Daten der einzelnen Forschungsobjekte wurde ein Vergleich von beiden Abfallmanagementsysteme durchgeführt und deren Vor- und Nachteile aufgezeigt. Um dies zu erreichen, wurde vorgeschlagen, die Systeme in Sektorblöcken zu vergleichen und die methodischen Ansätze bei der Klassifizierung zu klassifizieren [4].

Der Europäische Abfallkatalog ist für Produktions- und Nicht-Produktionsprozess klassifiziert. Es gibt 20 Blöcke, 111 Gruppen und 839 Arten von Abfällen [1]. Der russische Klassifikator ist in bildeneden Zweigen unterteilt. Es besteht aus 8 Blöcken, 60 Gruppen und 2359 Abfallarten.

Obwohl der europäische Abfallkatalog 839 Abfallschlüssel hat, besteht ein Problem der mangelnden Klärung in den Codebeschreibungen. Dies bringt den weit verbreiteten Einsatz von 99-Codes in einigen Ländern. Das kann jedoch unsachgemäße Durchführung des Verfahrens der Bezugnahme auf eine bestimmte Art von Abfällen fällig. Im Allgemeinen haben die Mitgliedstaaten etwa 300 zusätzliche Sondercodes vorgeschlagen [2].

In der Russischen Föderation wurde die Methodik der Abfallzertifizierung entwickelt. Für solche Zwecke ist FCFC. Der Klassifikator hat sowohl einen 13-stelligen Escape-Code als auch seine Gefahrklasse. Sobald die Gefahrklasse festgelegt ist, geht ein Weiterverarbeitung von Abfallpass weiter.

Für den Fall, wenn die Position mit dem Code nicht festgelegt ist, ist es möglich, Biotesting und quantitative chemische Analyse durchzuführen sowie die Gefahrklasse von Abfällen zu berechnen. Nach Durchführung dieser Daten ist es möglich, diese Abfälle einer bestimmten Gruppe oder Untergruppe zuzuordnen und damit den Abflugpass weiter zu formalisieren. Danach wird der Pass zur Genehmigung an die territorial Körperschaft von Rostekhnadzor geschickt und auch in der nächsten Fassung des FCSC enthalten wird [3].

Die Systeme wurden anhand der in der 1. Tabelle angegebenen qualitativen Indikatoren bewertet.

Kriterien	FCFC	ECO
Regelmäßige Erneuerung des Systems	+	+
Verfügbarkeit von Code für jede Art von Abfällen	-	-
Klassifizierungsbequemlichkeit	-	-
Einzigartigkeit des Klassifikators	+	-
Verfügbarkeit der Abfallidentifikationsmethodik	+	+
Genauigkeit der Codebestimmungen	-	-
Verfügbarkeit der Gefahrklassen	+	-

Tabelle 1. Kriterien für die Schätzung von Abfallsystemen

1. Beide Abfallmanagementsysteme werden einmal pro Jahr unter Berücksichtigung neuer Änderungen aktualisiert.

2. Es gibt Abfälle, die ihre Codes nicht in den Katalogen haben, die als "andere Abfälle" bezeichnet werden müssen.
3. Beide Klassifikationen sind wegen der verzweigten Blockgruppen-Untergruppe System-Art von Abfällen für die Orientierung schwierig.
4. In der ECO gibt es "Spiegeleingänge" - doppelte Codes für gefährliche / nicht gefährliche Abfallveränderungen mit einem komplexen Gefahridentifizierungssystem.
5. Beide Systeme haben Technodien zur Identifizierung von gefährlichen Abfällen, aber sie sind oft zu kompliziert für Benutzung.
6. Wegen der Verfügbarkeit von analogen Codes gibt es eine Schwierigkeit mit der genauen Definition des Codes.
7. Der FCCC-Code hat die Zugehörigkeit der Abfälle zu einer der 5 Gefahrenklassen an, und in der ECO wird der Abfall in nur zwei Kategorien eingeteilt: gefährlich und nicht gefährlich.

Der europäische Abfallkatalog hat eine Reihe von Nachteilen. Es ist erforderlich, die Katalogstruktur und das Verfahren für die Zuordnung eines Abfalls zu einem bestimmten Code zu verbessern und auch ein Gleichgewicht in der Anzahl und Relevanz der Codes zu erreichen. Das Klassifizierungssystem muss auch entwickelt werden, damit jede Art von Abfall eindeutig identifiziert werden kann [1].

Das System ist nicht gut und muss weiterentwickelt werden. Es gibt einen Block, der alle Abfälle enthält, die nicht in einem anderen sektoralen Block enthalten wird. Also, es wird empfohlen, diese Arten von Abfällen genau in ihren eigenen Blöcken zu analysieren und zu verteilen. Dementsprechend ist es notwendig, ein System der nachhaltigen Abfallwirtschaft zu entwickeln. Und in der Zukunft eine Rahmengesetzgebung in Abfällen zu erarbeiten.

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**ECONOMIC ASPECTS OF IPLEMENTATION
OF BESTAVAILABLE TECHNOLOGIES IN CEMENT
PRODUCTION**

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Abstract: The approach to the implementation of best available techniques in the cement industry was reviewed. The criteria of the effectiveness of the new technology are shown. The positive results from the application of the mechanism of the best available technologies were obtained in the economic aspect for cement production.

Key words: the cement industry, best available technologies, introduction of new technologies, efficiency indicator, productivity, growth in labor productivity, economic effect.

There is a wide range of interpretations of the intensity of anthropogenic impact on the biosphere about the inevitability of environmental catastrophe to skimp from alarmists, who ignore the obvious facts of the increasing human impact on the environment. This refers to the problem of balancing the achievement of economic and environmental goals. This approach is based on the introduction of best available technologies that are relevant to Russian industry in General and for the enterprises of cement production.

The term "best available techniques" is defined by Article 1 No. 7 of the Federal law "On environmental protection" /2/ according to which best available technology (BAT) – technology of production of products (goods), performance of works, rendering of services,

determined on the basis of modern achievements of science and technology and the best combination of criteria for achieving environmental protection, subject to technical feasibility of its application.

In the cement industry-Union cement producers together with leading expert and analytical organizations have developed industry reference NTD, the implementation of which will allow not only to improve the environmental performance of companies in the industry, but will also contribute to accelerated technological development, the structure of the BREF "cement Production" in line with the Provisional national standard PNST 21-2014 /3,5/, and the format descriptions of the technologies – Advanced national standard PNST 23-2014.

Developing indicators of efficiency of introduction of new technology should be based on the ultimate purpose of the introduction. To determine the effectiveness the following system of General indicators should be used.

1. Generalising indicators of economic efficiency of specific technical and scientific activities, providing communication with the generalizing performance indicators of production:

- the pace of efficiency gains from the introduction of new technology or the effectiveness of the introduction of new technology or cost reduction
- growth of production, net of production through the effective implementation of new technology
- save labor costs as a result of introduction of new technology or savings from cost reduction
- profit growth by reducing costs of production from the introduction of new technology

2. Indicators of increase in efficiency of use of labor from implementing new technology:

- the growth rate of labor productivity from implementation of new technology
- the saving in the number of employees of the new equipment
- increase in clean, marketable products and profits through the introduction of new technology
- the payroll savings from the use of new technology

3. Indicators enhance the effectiveness of fixed assets used in innovation:

- saving depreciation costs for implementation of new technology
- increase of profits and commercial products by saving the cost of depreciation as a result of introduction of new technology

4. The indicators of increase in efficiency of use of material resources from the implementation of new technology

- increase in material return in the production of specific products through the introduction of new technology

- reduction of material costs from the introduction of new technology

- the increase in the net commodity production and the profit by increasing material return and reduce material costs from the introduction of new technology.

So the use of best available technologies can reduce the amount of generated waste, which can be seen by the example of the transition of the units of electrostatic precipitators UG2-4-53 rotary kiln and humidification of gases.

Thus, one of the most important implications of the use of the mechanism of BAT in addition to a General decline in the level of contamination, will accelerate technological development, which will stimulate not only administrative sanctions, but also economic effect.

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**ECOSYSTEM SERVICES AS A TOOL OF "GREEN"
ECONOMY**

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Abstract: This article defines the concept of "ecosystem services". An attempt is made to demonstrate the importance of introducing ecosystem services. The classification of ecological services and examples of application in practice are given. The relationship between the application of ecosystem services and sustainable development is indicated.

Key words: green economy, sustainable development, human capital, knowledge economy

At present, when the issues of environmental protection and rational nature management receive a fresh impetus for their development, the notion of "green economy" is increasingly heard.

It should be emphasized that researchers have not developed a generally accepted definition of the "green economy". Thus, A. Steiner believes that the "green" economy is an economic activity that increases "the well-being of man and society, ensures social justice, and at the same time substantially reduces environmental risks in the part of impoverishment of nature" [8], vol. E. Has a dual task - "along with modernization and increasing production efficiency contribute to improving the quality of life and living environment" [5]. Close approaches concerning the quality of life and the ecological state of the environment are encountered in the works of other authors [6; 8; 9].

For the Russian reality, the green economy is perceived as something that is not completely understandable and exotic, and in most cases reduces to rational use of nature for simplification, which is certainly a mistake.

In the arsenal of the green economy, you can find a wide range of approaches and ways to organize the management system. One such way is the so-called "ecosystem services".

Under ecosystem services (hereinafter referred to as "EC") it is accepted to understand all the benefits that humanity derives from natural or artificial ecosystems [1]. Such a definition was given in the work program "Millennium Ecosystem Assessment" (hereafter referred to as "MA"). In other words, these are ecosystem services for providing humanity with natural resources, a healthy habitat, and other ecologically and economically significant "products".

Of special interest is the development of the ecosystem services market for Russia (as one of the largest "ecological donor"). This line of development has all the chances to take a worthy place in the structure of the national economy and can be very profitable for investment.

Like most services, EIs can also be differentiated based on a certain feature. An analysis of the literature available to us shows that at the present time, in view of the inadequate study and relatively short time of research on this issue, there is no single and generally accepted classification. At the same time, the structure that was outlined in the MA program has been widely recognized and used as one of the bases in the classification of ecosystem services. So, among the EE, 4 groups can be conventionally distinguished:

1st group - providing services (for example, they include agricultural crops, livestock and game animals, seafood, food from wild plants and animals, drinking water, etc.);

2nd group - regulatory services (regulation of climate processes and carbon cycle at the local level, water and air purification, etc.);

3rd group - supporting services (soil formation, water and nutrient cycling, primary production, etc.);

4th group - cultural services (sports, hunting, fishing, ecotourism, scientific research, education).

Among these groups, support services differ from those that provide, regulate and cultivate that they affect people's lives indirectly

[2, 3], and usually for a long time. All other ecosystem services - providing, regulating and cultural - depend on supporters.

Benefits from ecosystems are manifested at different levels, users can also be very diverse. At the local level, ecosystem services often form the basis for life and subsistence in rural areas, especially for the poor. For example, the collection of medicinal plants for traditional medicine can replace the more expensive pharmaceutical products manufactured by industrial methods. Benefits can also occur at the regional level, for example, protecting residential areas and businesses from flooding and soil erosion through coastal mangrove forests, or at the national level, such as places that are part of the country's cultural heritage. Globally, ecosystems regulate the climate and support the biological diversity that underlies the creation of biological products.

Enterprises and projects can also benefit from ecosystem services through the direct use of resources (eg water) or protection against natural disasters (eg floods). Defining and protecting such services can have additional advantages, namely: it helps to avoid penalties and negative media coverage, strengthen the reputation of the company, and in some cases will allow the use of effective alternative solutions instead of more expensive technical solutions.

Summarizing the above, we can draw the following conclusions:

1. The role of ecosystem services in the context of the "green" economy is that sustainable development of the society can not be achieved in the conditions of deterioration (loss) of biological diversity or ecosystem services.

2. To achieve the desired safety and security of existing ecosystems by developing activities at the state and regional level to improve the environmental culture among the population, including the introduction of appropriate educational programs for primary, secondary and higher education.

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JUSTIFICACION AMBIENTAL Y ECONOMICA PARA LA PLANIFICACION DE LA RESPUESTA DE EMERGENCIA AL DERRAME CATASTROFICO DE PETROLEO EN LAS AGUAS MARINAS

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Resumen. *En este trabajo está presentada una justificación ambiental y económica para la planificación de la respuesta de emergencia al derrame catastrófico de petróleo en los ambientes marinos. La producción de petróleo por parte de la humanidad se está moviendo cada vez más hacia las profundidades del mar y hacia el polo norte. Estas dos áreas complican cada vez más el trabajo para eliminar derrames de petróleo. Las condiciones especiales de estas áreas son favorables para situaciones de emergencia de tamaño catastrófico y es necesario estar preparado para las acciones de respuesta rápida al derrame.*

Palabras claves: *petróleo, derrames en el mar, planificación, respuesta a derrames, ecología, economía. (Esp.)*

Introducción. Las aguas del océano mundial tienen una gran potencia de auto limpiarse, pero la contaminación por los hidrocarburos en derrames catastróficos pone en duda su suficiencia en esto, y que este tipo de contaminación amenaza a su función principal correcta. Las empresas petroleras se preparan para los accidentes más posibles y los derrames más comunes (que no son de tamaño catastrófico). En el presente trabajo se determina la justificación de la planificación de la

respuesta de emergencia al derrame catastrófico de petróleo en las aguas del océano mundial.

Materiales. En la investigación entre la larga lista de los derrames de petróleo en aguas marinas de los últimos 30 años se tomó dos accidentes de derrames catastróficos:

1) del petrolero Exxon Valdez en 1989 en Alaska [1, 2] – por la magnitud, la ubicación (la zona climática) y la antigüedad;

2) de la plataforma petrolera Deepwater Horizon en 2010 en el golfo de México [3, 4] – por la magnitud, la ubicación (la profundidad de las aguas) y la antigüedad.

Fueron investigados los datos de los accidentes: las causas, la magnitud del derrame y los daños ecológicos y económicos inmediatos, la preparación y ejecución de la respuesta al derrame y el estado actual de los ecosistemas afectados.

Resultados. A base de esta investigación fueron detallados los siguientes puntos.

1. El petróleo en la superficie marina primero empieza extenderse en una superficie cada vez mayor hasta formar una mancha extensa con espesor de décimas de micrómetro (en una hora y media 1 m³ llega a ser 100 metros en diámetro) y empieza a degradarse:

- por evaporación: y este vapor es descompuesto por la fotooxidación en la atmósfera;

- por la dispersión vertical debido al efecto las olas: las gotitas de petróleo suspendido permanecen dispersas durante semanas y esta emulsión llega tener mayor volumen que el petróleo vertido;

- por sedimentación;

- por biodegradación.

2. La producción de petróleo se está moviendo cada vez más hacia las profundidades del mar y hacia el norte. Las condiciones especiales de estas áreas son favorables para situaciones de emergencia de tamaño catastrófico. [6].

En el accidente del Exxon Valdez la compañía por su irresponsabilidad no estaba preparada para ningún derrame de petróleo. En caso de Deepwater Horizon por las condiciones específicas y poco confrontadas de las aguas profundas – la compañía no estaba preparada para un derrame en el subsuelo marino. Resultado – un derrame incontrolado por meses. Las zonas marítimas afectadas hasta hoy tienen

afectadas propiedades físicas y químicas del agua y de los organismos vivientes en ella.

3. Comprender la importancia de planificar y preparar una respuesta a estos eventos extraordinarios y de ahí hacer que la industria petrolera sea lo menos dañina posible.

Conclusión. El océano tiene cualidad de auto limpiarse pero no es suficiente en casos de los derrames de petróleo. Para minimizar impacto negativo de la industria petrolera, primero es necesario justificar la planificación de derrames de petróleo en condiciones marinas.

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**MAINTENANCE OF THE STATE REGISTER OF LANDFILL
FACILITIES**

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Abstract: The article is devoted to problems of the applicable environmental legislation of the Russian Federation, including maintenance of the state property of waste disposal, its advantages and disadvantages.

Key words: state register of landfill facilities, legislation of the Russian Federation, landfill facilities, landfills, Federal law.

Despite the fact that the Federal Law #89-F3 of 24.06.1998 “On industrial and household waste” (further on referred to as Law) was implemented almost 20 years ago, environmental legislation of the Russian Federation finds itself at the initial development stages. For instance, one of the legal instruments which allows controlling the number of solid waste landfills in the country is the state register of the landfill facilities (henceforth referred to as SRLF). The given register was created in 2014, and according to the Law each landfill facility (LF) is in all cases to appear in the register. If for this or that reason an LF is not included into the register, it is forbidden to put it into operation till its inclusion in the SRLF [1, 2].

In order to include a landfill in SRLF, a legal entity or a self-employed entrepreneur, who operates the given landfill, is to present a specification of the LF in question to the Federal Service for Supervision of Natural Resources. Provided specification is further considered and analyzed in accordance with the Law and with the recommendations of the Ministry of Natural Resources and Environment of the Russian Federation. Based on the results of this analysis, a specialist can draw a conclusion if the given territory is just a dumping place or an actual landfill facility that conforms with the sanitary norms and regulations. Thus, maintenance of the given register at the federal level allows regulating and estimating the number of landfills which operate in the territory of the country, as well as determining the degree of population of landfills [3].

Conducting an analysis, a specialist should pay special attention to the two aspects of the presented specification: whether this facility has project documentation and favourable resolution of the State Environmental Expert Review. Project documentation has a particular weight in this decision as, in accordance with the definition given in the Law, facilities of waste disposal are specially equipped with installations created for the purpose of waste storage. Since the Law describes a landfill as a specially equipped installation, then, according to the city planning code, in all cases a landfill has a project documentation as it is considered a capital construction object. This clause makes it difficult for the dumping sites to be included in the SRLF if they lack the required project documentation.

However, there are some problems connected with this aspect of specification. According to the applicable legislation, the given clause is not mandatory. Thus, in case a landfill facility is declined to be included in the register on the grounds of this clause, an entity that runs this facility has the right to file a lawsuit. In the course of judicial proceedings, a verdict is made whether to include this facility in the SRFL [4].

This loop in the legislation needs to be eliminated by way of passing and correcting existing statutory instruments. This problem has to be faced as soon as possible as the problem of waste becomes more and more relevant every year.

In conclusion, we should note that the problem of large number of overpopulated landfills around the country, the so-called 'waste collapse', broke the deadlock in June 2017 when "Kupchino" landfill facility was closed by the presidential edict. Then several other landfills were closed in the Moscow region, these are: "Kulakovsky", "Tsaryovo", and "Kaurtsevo". The fact that these landfills were closed is a sign that the Russian Federation is moving to a new state of formation, management and storage of waste.

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Wang Xinqiang

**THE DIFFERENCES IN ECONOMY BETWEEN
CHINA AND RUSSIA**

China

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Abstract: As we know, both China and Russia are large parts in this world according to the area of land aspect and the economic aggregate aspect. So, we think it is of great significance to discuss the differences of economy between two of them. In order to make it more understandable, we would like to explain it from several points of view.

Key words: China, Russia, purchasing power parity.

Overview of China's economy

Since the late 1970s, China has moved from a closed, centrally planned system to a more market-oriented one that plays a major global role; in 2010, China became the world's largest exporter. Reforms began with the phaseout of collectivized agriculture, and expanded to include the gradual liberalization of prices, fiscal decentralization, increased autonomy for state enterprises, growth of the private sector, development of stock markets and a modern banking system, and opening to foreign trade and investment. In recent years, China has renewed its support for state-owned enterprises in sectors considered important to "economic security," explicitly looking to foster globally competitive industries. The restructuring of the economy and resulting efficiency gains have contributed to a more than tenfold increase in GDP since 1978. Measured on a purchasing power parity (PPP) basis that adjusts for price differences, China in 2015 stood as the largest

economy in the world, surpassing the US in 2014 for the first time in modern history. However, China's per capita income is below the world average. Economic development has progressed further in coastal provinces than in the interior, and by 2014 more than 274 million migrant workers and their dependents had relocated to urban areas to find a job. One consequence of population control policy is that China is now one of the most rapidly aging countries in the world.

The Chinese government is seeking to add energy production capacity from sources other than coal and oil, focusing on nuclear and alternative energy development. Several factors are converging to slow China's growth, including debt overhang from its credit-fueled stimulus program, industrial overcapacity, inefficient allocation of capital by state-owned banks, and the slow recovery of China's trading partners. The government's 13th Five-Year Plan, unveiled in November 2015, emphasizes continued economic reforms and the need to increase innovation and domestic consumption in order to make the economy less dependent in the future on fixed investments, exports, and heavy industry. However, China has made only marginal progress toward these rebalancing goals. The new government of President XI Jinping has signaled a greater willingness to undertake reforms that focus on China's long-term economic health, including giving the market a more decisive role in allocating resources.

Overview of Russia's economy

Russia has undergone significant changes since the collapse of the Soviet Union, moving from a centrally planned economy towards a more market-based system. Both economic growth and reform have stalled in recent years, however, and Russia remains a predominantly statist economy with a high concentration of wealth in officials' hands. Economic reforms in the 1990s privatized most industry, with notable exceptions in the energy, transportation, banking, and defense-related sectors. The protection of property rights is still weak, and the state continues to interfere in the free operation of the private sector. Russia is one of the world's leading producers of oil and natural gas, and is also a top exporter of metals such as steel and primary aluminum. Russia's reliance on commodity exports makes it vulnerable to boom and bust cycles that follow the volatile swings in global prices. The economy, which averaged 7% growth during 1998-2008 as oil prices rose rapidly, has seen diminishing growth rates since then due to the exhaustion of Russia's commodity-based growth model. A combination

of falling oil prices, international sanctions, and structural limitations pushed Russia into a deep recession in 2015, with the GDP falling by close to 4%. Most economists expect this downturn will continue through 2016.

Government support for import substitution has increased recently in effort to diversify the economy away from extractive industries. Although the Russian Ministry of Economic Development is forecasting a modest growth of 0.7% for 2016 as a whole, the Central Bank of Russia (CBR) is more pessimistic and expects the recovery to begin later in the year and a decline of 0.5% to 1.0% for the full year. Russia is heavily dependent on the movement of world commodity prices and the CBR estimates that if oil prices remain below \$40 per barrel beyond 2016, the resulting shock would cause GDP to fall by up to 5% [1].

Comparison of these two countries

First of all, I will talk about the GDP of the two countries. As for China, the gross domestic product is about \$21.27 trillion in 2016, \$19.95 trillion in 2015 and \$18.67 trillion in 2014. From this, we could see that China's GDP growth rate has always been fluctuating between 6% and 7% in the recent three years. Also, China's GDP is listed on the top in this world. When it comes to Russia, the gross domestic product is about \$3.745 trillion in 2016, \$3.774 trillion in 2015 and \$3.92 trillion in 2014. And we can see that the gross domestic product has been decreasing in Russia during these two years despite its large total economy. So, from the GDP aspect, China's economy is going to be better than Russia's. Meanwhile, the proportion of population below poverty line in China is much smaller than in Russia (6.1% in China and 11.2% in Russia). And when we look at the data of GDP composition (as for China: agriculture 8.6%, industry 40.7%, services 50.7%; as for Russia: agriculture 4.7%, industry 33.1%, services 62.2%) [2], we could see that Russia has put most of its concentration on services development, as a result, Russia's light industry is less advanced compared to the whole world, so is agriculture.

For instance, as an exchange student in Russia, I can apparently feel that the vegetables, fruits and manufacturing goods seem to have a higher price than in China. I would not deny that labor cost is much cheaper in China as a fact of 805.9 million labor force while it is just 77.41 million in Russia which is one of the factors of a higher price of goods in Russia, On the contrary, large labor force is actually one of

China's advantages in developing manufacturing industry. Frankly speaking, most experts from China agree with the idea that manufacturing industry is the most important factor to make a country of strong economy. Besides, manufacturing industry will also create a lot of job opportunities to decrease the unemployment rate (unemployment rate: 4.2% in China and 8.2% in Russia in 2016). In order to motivate the development of manufacturing industry, I think the government should offer a low interest rate and make welfare policy for them while the central-bank interest rate in Russia is 11% which is so high for entrepreneurs to take out a loan (the interest rate in China is only about 2.25% which has benefits for the developing economy).

As for the international trade part: the exports and imports for China are \$2.011 trillion and \$1.437 trillion respectively. And its major partner are the United States, Hong Kong, Japan, South Korea, Germany and Russia; the exports and imports for Russia are \$259.3 billion and \$165.1 billion respectively in 2016. And its largest partner is China which accounts for 18% of the total trading, Germany, the United States, Italy and Turkey are also its major partners. As we know, Russia's natural resources provided it with a lot of advantages which other countries can never create in such a big volume (petroleum listed NO 2 and natural gas listed NO 1). Also, ore resources are much richer than in other countries.

So, there is no doubt that these three parts account for the large part of exporting and bring a lot of fortune to Russia. The situation is such a coincidence when we compared Russia with China, because China is the country that lacks petroleum and natural gas which is abundant in Russia. So, I guess there is a natural bridge between China and Russia being built, the relationship between two of them must be tighter and stronger. Totally speaking, China's economy situation is better than Russia's. However, we, two countries, definitely can't grow into strong countries in every aspect without each other's support. In other words, in order to improve the welfare of the Russian and Chinese, China and Russia must have a long-term and friendly cooperation.

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ECOLOGY, POLITICS AND SOCIETY

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GEOMARKETING IN NATURE MANAGEMENT

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Abstract: The introduction of an environmental component into geomarketing can address a large number of environmental problems and tasks related to territorial issues of location of environmentally important facilities. A new concept can be developed based on marketing, geoformation and ecology.

Key words: geomarketing analysis, nature management, geoinformation systems, spatial analysis, geocomarketing, ecological component

Introduction. Geomarketing is a concept or technology for conducting marketing research as a result of which strategic, conceptual and managerial decisions are made based on methods of geographical analysis of various spatially distributed objects and phenomena [1]. Due to geomarketing research, such indicators as target audience, competition, optimal location, forecast of the planned site development and get the maximum benefit from the used land plot, define a flexible concept for the planned activity with the further possibility of its adaptation to changing environmental conditions [2,3].

Methodology. The application of geomarketing analysis can be expanded and include not only the geomarketing of retail outlets, real estate objects and the sphere of business vision. At present, the development of ecology and nature management is of great importance for the whole world, and for Russia in particular. Introduction of an environmental component into geomarketing can solve a large number of environmental problems and tasks related to territorial issues of location of environmentally important facilities, for example, in the field of waste management - landfills, incineration plants, waste processing complexes, waste sorting stations, etc. The basic factors of such objects placing are environmental norms and rules at the legislative level and the expected impact of the object on environment.

The consideration of environmental legislation in the conduct of geomarketing analysis can contribute to the search for the most rational territory for the location of the facility, for example, from the point of view of the sufficiency of the proposed site construction site for organizing the necessary area for the sanitary protection zone or determining the remoteness of the selected area of the facility location from specially protected natural territories, water protection zones and other objects of ecological importance.

In addition, spatial determination of the impact of the proposed activity on the environment is of particular importance. In this case, it is necessary to consider the introduction of the main parameters used in carrying out the Environmental Impact Assessment (EIA), capable of providing a spatial, technological, statistical and, as a result, visual representation of the territories that provide rationality and safety when locating the industrial facility, and in particular the facility associated with waste management.

Such spatial data can include:

- land resources (land use types, seized land, quality of seized land);
- climatic factors (meteorological conditions of the territory);
- soil factors (soil productivity);
- geological and engineering factors (seismicity, karst processes, exogenous processes, etc.);
- hydrogeological factors (availability of groundwater, their movement, connection with surface water bodies);
- geomorphological factors (relief type, relief shape, slope exposition, landscape type);
- hydrological factors (presence of water bodies, their condition, area, water flow in the watercourse, etc.);

- biological factors (the state of the vegetation cover, the area under cultivation, the breed and age composition of the forest fund, etc.)

Results and conclusion. Thus, we can talk about the introduction of a new concept - "geoecomarketing", "geoecomarketing analysis" and "geoecomarketing research", which includes three components (Fig. 1).



Figure 1. Components of geocomarketing

The introduction of the ecological component into the geomarketing analysis takes it to a fundamentally new level, allowing to combine data on the socio-economic situation within the study area with data on the ecological state of this territory.

In conclusion we can talk about a full-fledged study that includes geo-information, demographic, socio-economic, physical and geographical characteristics based on methods of network analysis, statistics, accessibility analysis, location, routing, buffer zone construction, and ecological methods, environmental studies, selected depending on the nature of the proposed activity. Such environmental methods may include approaches for determining pollutant emissions and their dispersion in the atmosphere, surface waters and soils from objects of various activities, methods for calculating the noise load on the territory, the methodology for adjusting the size of the sanitary protection zone, the methodology for calculating maximum-one-time emissions and etc.

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ENVIRONMENTAL RATING OF THE UNIVERSITY

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Abstract: Leading world universities are now paying much attention to the problems of sustainable development and environmental management. They form their own environmental activities, which are followed by the development of environmental policy. Environmental rating is a tool for the formation of environmental policy of the university.

Key words: environmental policy, ecological rating, sustained development, UI GreenMetric.

Introduction. The rating is now widely used in many fields of activity, ecological sphere included. It is expressed in terms of a numeric value. The indicator shows the degree of importance or importance of the object. Environmental rating is a tool to improve the effectiveness of environmental activities of the organization. It can act as an adjunct to legal regulation.

The innovative environment of the university closely interacts with environmental policy. Since the use of advanced solutions and energy-saving technologies allow the higher educational institution to function without prejudice to its basic educational activities.

Environmental policy is a set of basic principles, intentions and obligations of the enterprise, which creates the basis for developing its own environmental goals and objectives [2, p.75].

Implementation of environmental policy the university demonstrates its achievements in the field of environmental management. To investors, partners, entrants and for the region as a whole. But the implementation of environmental policy should not impair the university's innovation policy.

An environmental rating is needed when forming an environmental policy.

For university the greatest interest is represented by the world rating of universities UI GreenMetric (UI GreenMetric World University Rankings). The goal is to rank universities around the world, depending on the sustainable ecological development of campuses. Creating an energy-efficient model of university management [1, p.56].

The rating is based on the concept of environmental sustainability. It includes three elements: environmental, economic and social ones.

The economic component implies the optimal use of limited resources and the use of saving technologies, the creation of environmentally acceptable products, minimization, processing and disposal of waste.

The social component is aimed at a person. It is aimed at preserving the stability of social and cultural systems. An important aspect is the fair division of wealth.

Ecological component. Sustainable development must ensure the integrity of biological and physical systems. Of particular importance is the viability of ecosystems on which the global stability of the entire biosphere depends. The main focus is on maintaining the capacity for self-recovery and the dynamic adaptation of such systems to changes.

For 2017, UI GreenMetric's management defined the criteria and their weighting factors for calculating the percentage. They include: environment and infrastructure (15%), energy and climate change (21%), waste (18%), water (10%), transport (18%), education (18%).

Thus, by raising its ecological rating, the university promotes the formation of a quality environmental policy. These two important documents bring to a qualitatively new level the system of environmental education.

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ACTUAL PROBLEMS OF MODERN EDUCATION

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PRACTICE-ORIENTED EDUCATION AS THE BASIS OF PERSONNEL TRAINING IN THE FIELD OF ENGINEERING ECOLOGY

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Abstract: Training of personnel in the field of environmental safety and environmental protection is an important part of the development and implementation of "green" technologies and the provision of non-waste products at enterprises of various industries. An important part of the educational process is integration with production, where students receive practical experience and knowledge for further professional activities.

Key words: environmental engineering, treatment of organic waste, Kazan

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ПРАКТИКООРИЕНТИРОВАННОЕ ОБРАЗОВАНИЕ КАК ОСНОВА ПОДГОТОВКИ КАДРОВ В ОБЛАСТИ ИНЖЕНЕРНОЙ ЭКОЛОГИИ

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Аннотация: Подготовка кадров в области экологической безопасности и защиты окружающей среды играет важную роль в развитии и внедрении "зеленых" технологий и обеспечения безотходного производства на предприятиях различных отраслей экономики. Важной частью образовательного процесса является интеграция с производством, где обучающиеся получают практический опыт и знания для своей дальнейшей профессиональной деятельности.

Key words: инженерная экология, производственная практика, обработка органических отходов, Казань

В современных условиях при высоких темпах развития экономики, предприятия создают серьезную антропогенную нагрузку на окружающую среду. Для обеспечения минимизации

этого воздействия необходимо организовать на предприятии системы очистки выбросов, сбросов и переработки отходов производства либо их вторичного использования [1]. Однако, все это невозможно без квалифицированных инженерно-экологических кадров.

Кафедра "Инженерная экология и рациональное природопользование" (ИЭР) Казанского государственного энергетического университета (КГЭУ) ставит своей главной задачей подготовку бакалавров и магистров в области инженерной защиты окружающей среды.

Важной частью образовательных программ является их практикоориентированность. Широкий спектр предприятий различных отраслей экономики Республики Татарстан (РТ) позволяет обеспечить студентов кафедры местами для прохождения производственных и преддипломных практик, где будущие выпускники имеют возможность изучить производственный цикл предприятия, ознакомиться с реальным природоохранным оборудованием и выявить наиболее "опасные" для окружающей среды этапы производства.

Полученные в ходе практик материалы ложатся в основу бакалаврских и магистерских выпускных квалификационных работ, где обучающийся подбирает оптимальные пути решения реальных экологических проблем с учетом всех экологических, экономических, энергетических и технических расчетов.

Другой важной частью подготовки инженерно-экологических кадров является внедрение в образовательный процесс результатов научно-прикладных исследований, проводимых профессорско-преподавательским составом кафедры.

Кафедра ИЭР сотрудничает с такими ведущими компаниями, как SARAD GmbH (Германия) в области мониторинга состояния окружающей среды и VOMM Impianti e Processi S.p.A. (Италия) в области переработки органических отходов. На базе этих организаций проходят стажировки как сотрудники кафедры, так и инженерные кадры в ходе реализуемых программ повышения квалификации.

В ноябре 2016 года совместно с компанией VOMM на базе КГЭУ проведены экспериментальные исследования переработки органических отходов четырех предприятий Республики

Татарстан: отходы бумажного производства ЗАОр "НП НЧ КБК им.С.П.Титова" (Набережные Челны), осадки биологических очистных сооружений МУП "Водоканал" (Казань), подстилочный птичий помет ООО "Челны-Бройлер", обессахаренная свекловичная стружка ЗАО "Нурлатский сахар" (Нурлат) и ООО "Заинский сахар" (Заинск).

Полученные экспериментальные результаты были доложены на Международном эксперт-форуме «Инновационные технологии переработки органических отходов в различных отраслях экономики». Эксперт-форум прошел на базе КГЭУ при участии Управления Росприроднадзора по РТ, Министерства экологии и природных ресурсов РТ, Приволдского управления Ростехнадзора и др.

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THE PROBLEM OF THE FORMATION OF UNIVERSITY STUDENTS' VALUE AND MEANINGFUL ORIENTATIONS

Russia

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Abstract: The paper covers the problem of the value and semantic grounds for the formation of the student youth's personality. Different approaches and ways of solving the problem in the educational environment are introduced and analyzed.

Key words: values, value orientations, meaningful orientations, meaning of life.

Introduction

The problem of value and meaningful orientations is one of the key issues in modern psychology. This is due to the recognition of the role of value priorities as an important factor in the behavior of the individual. It is generally recognized that the system of value and meaningful orientations of the personality is formed under the influence of changing living conditions - social, economic, political, etc. Studies conducted both in Russia and abroad are a response to the need to monitor the changes in the values priorities of the population (M.S. Yanitsky, N.A. Zhuravlev).

Student youth, like any other social group, is characterized by age limits, psychological features, ways of socialization, educational, professional and cultural readiness for self-realization.

Methodology

In psychological research, values are considered as vital goals, meanings and ideals that determine the general direction of activity and personal values as one of the forms of the existence of values. However, most authors do not distinguish between personal values and value orientations, often treating them as synonyms.

We consider value orientations as a system of individual attitudes, beliefs, preferences mediated by personal meanings, which is expressed in behavior. This system largely determines the motivation of human behavior and has a significant impact on all aspects of its activities. Value orientations characterize the internal readiness for the performance of a particular activity related to the satisfaction of needs and interests, point to the direction of individual behavior (A.V. Seryi, M.S. Yanitsky).

With the problem of the value orientations formation, young people have many approaches that determine the role of the system of the individual's value orientations in the ontogenesis of the man. Society offers many values, but the way to them is individual: it is the search for the meaning of life, its place in it. E. Erickson connects this search with the solution of the problem of identity [15]. The main provisions of the concept of M. Rokich's values boil down to the following: the total number of values is small; all people have the same values, but the same values have different "weight" for different people; values are organized into systems; the origins of human values are traced in culture, society, social institutions and in the individual's

personality; the influence of values can be traced in practically all social phenomena [10]. A perspective direction in the study of the value sphere of the personality is an age-psychological approach based on taking into account the structure of the psychological age as a triune of the social situation of development, leading activity and psychological neoplasms (L.S. Vygotsky, D.B. El'konin). In adolescence, meaningful orientations acquire exceptional significance, by which they understand the way a person constructs his own life with a system of values, meanings and goals inherent in him. Awareness of meaningful landmarks in this period acquires a promising strategic direction, freedom from the influence of temptations of the situation and momentary, impulsive motives. It is at this age that prerequisites are formed for the emergence of a higher system of regulation, characteristic of a mature autonomous personality - a system based on the logic of free choice. In the opinion of V.E. Chudnovsky [11], the structure of the meaning of life is based on the hierarchy of "big" and "small" meanings. The peculiarities of the "structural hierarchy" are conditioned not only by the formally dynamic, but in many ways also the content characteristic of this phenomenon.

From such positions the dispositional concept of the social behavior regulation of an individual by V.A. Yadov [12] is of a considerable interest. According to this concept, social attitudes, value orientations of a person are in a certain hierarchy and together they form a kind of the disposition system, hierarchically organized entities that regulate behavior and activity. The general scheme of dispositions includes a hierarchy of needs and situations, at the intersection of which four levels of dispositions are distinguished: 1) the level of elementary fixed installations; 2) the level of social fixed installations; 3) the level of basic social attitudes; 4) the level of the system of the individual's value orientations. Value orientations regulate the behavior and activity of the individual in the most significant situations of his social activity, in which the person's attitude towards the goals of life activity is expressed as well as to the means of satisfying these goals; and social attitudes fix the general orientation of the individual with respect to a particular sphere of social activity. Consequently, according to V.A. Yadov, value orientations along with the general orientation of the individual's interests regulate his social behavior. Such a scheme of levels of dispositions allows us to consider the development of man

from the standpoint of comparing the dynamics of his terminal values-goals, instrumental values-means and general social activity of the individual.

Thus, the system of the individual's value orientations, firstly, does not remain unchanged throughout the life of a person. Secondly, the development of the individual's value orientations is associated with the development of other components of the personality - direction, goals, needs and motives. Thirdly, the student age plays a key role in the development of the value-semantic sphere of the personality, because as a result of the passage of this age stage a person receives a formed and equalized new formation-the sense of his life.

Above we noted that the meaningful orientations of a person are considered in psychology as a result of the realization of the values, goals and meaning of an individual's own life, in close connection with the concepts of "value orientations", "life goals" and "meaning of life".

V.E. Chudnovsky defines meaningful orientations as an integral system of conscious and selective links reflecting the personality's orientation, the existence of life goals, meaningfulness of elections and assessments, satisfaction with life (self-realization), and the ability to take responsibility for it, influencing its course.

D.A Leontiev sees the meaning as the principle of the regulation of human behavior by his life world as a whole [4].

The analysis of the literature testifies that at present time the study of the value-semantic sphere proceeds in several directions:

1) the identification of the specificity of the value-semantic sphere in representatives of various professions (Besputina, 2015; Dvoinin, 2011; Martynova, 2002; Likhacheva, Guslyakova, 2015; Petrova, 2011; Syrkina, 2010; Yashin, 2006);

2) identification and comparison of value structures in various ethnic groups (Safronova, 2010, Khaibulaeva, 2015);

3) comparison of the value-semantic sphere of the personality of healthy and sick people (Vityutina, 2010);

4) the identification of the specificity of the value-semantic sphere in healthy people in different life situations (Zhuravleva, 2012; Kashirskaya, 2008; Kudashev, Oleneva, 2008);

5) identification of features of the value-semantic orientation as a whole (Volochnikov, Ermolenko, 2004; Kalugin, Volochnikov, 2016; Leontiev, 2003; Janitsky, 2000).

The problem of the formation and dynamics of the value-semantic orientations of the individual is examined in studies in the context of the general laws of mental development, in direct connection with the features of age development at its various stages.

Researchers represent the formation of value orientations of the individual as a result of the interaction of developing mental structures with gradually expanding social experience (J. Piaget); as a result of internalization, the transition from an interpsychic (social) to an intrapsychic individual way of life (L.S. Vygotsky, A.N. Leontiev, B.G. Ananiev, A.G. Asmolov, D.A. Leontiev). L. Kohlberg considers the formation of value orientations of the individual through the consistent passage of human stages of moral development, as a result of which the values of society are internalized by the individual and their compliance becomes an internal need [8].

It is noted that, in adolescence, the system of value orientations acquires truly regulative functions (L.I. Bozhovich), the person's own worldview is formed, creating the possibility of forming an internal, autonomous system of values. However, the dynamic system of value orientations does not stop in its development, development crises lead to a rethinking of life goals, a change in the nature of activity and interpersonal relationships, and to a certain transformation of the value system (M.S. Yanitsky).

As environmental factors of the formation of an individual value system, researchers allocate a family, school, labor collective, acting as "translators of social experience", norms and values (G.M. Andreeva); it is indicated on the growing influence of the mass media and mass information processes on the person's value orientations (A.G. Asmolov, A.S. Reztsov).

In numerous studies related to the value and meaningful orientations of modern youth, a contradictory picture of the influence of social changes on the transformation of values is presented, which can be explained, first of all, by differences in methodological approaches to research and the theoretical grounds from which empirical data are interpreted.

In conclusion

Nevertheless, in these studies, general trends in the changing values and semantic sphere of youth in various social conditions are traced. The results of numerous studies of the laws of young people's

psychological development create a picture of the semantic orientations and values of young individuals in specific social conditions, which currently have a regular tendency to dramatic changes. Perhaps, this is the reason for the inexhaustible flow of theoretical and experimental research of the meaning-life orientations of the youth. In the interests of modern psychological and pedagogical practice it is extremely important to know the level of the current state of the value orientational system of young people in order to effectively and timely work with it.

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Abstrakt: To show examples of the examinations to which extent the use of learning platform in the RUDN University is expedient.

Stichwörter: entfernte Ausbildung, TUIS, Zweckmäßigkeit, Internet.

Die Fernausbildung wurde schon längst zu einem untrennbaren Teil des modernen Ausbildungssystems und ist nicht mehr daran wegzudenken. Heutzutage gibt es viele Möglichkeiten, die Fernausbildung zu bekommen: Ausbildende Kanäle in Youtube, Webseiten, Lernplattformen. Hauptverursache für solchen aktiven Aufschwung zu dieser Ausbildung wurde zweifelsohne der Internetverbrauch. Am 29.12.2012 wurde ein Bundestagsgesetz №273-FS „das Gesetz über der Ausbildung in der Russischen Föderation“ verabschiedet, das solche Ausbildung legitimierte. Das förderte seinerseits die Verbreitung der Fernausbildung.

In den weiten Regionen Russlands ist die Fernausbildung weit verbreitet, indem wir das Territorium des Staates in Sicht nehmen. Im Jahre 2016 erhöhte sich die Anzahl der Studierenden und betrug einen Million von Menschen. Es wird geplant, dass im Jahre 2017 diese Anzahl wieder erhöhen wird.

RUDN University verbraucht das telekommunikative lerninformativ System (TUIS) als ein integrativer Anteil des Ausbildungsprozesses, wo die einzelnen Vorlesungen spezifischer Disziplinen zuzuhören vorgeschlagen sind. Um zu verstehen, inwieweit es zweckmäßig ist und die Interessenten hat, wurde eine Befragung durchgeführt.

In dem anonymen Profil wurden folgende Fragen gestellt:

- ob im Laufe der Ausbildung in Seminaren/Vorlesungen telekommunikative lerninformativ System verbraucht wurde und in welchen Unterrichtsstunden
- seit wann
- in welchem Ausmaß
- kann man sie als zusätzliche Ausbildungsmethode oder als selbstständige Disziplin der Selbstausbildung betrachten

- Beziehung zu der Fernausbildung
- Inwieweit die Position annehmbar ist, die Unterrichtsstunden zu besuchen, um Prüfungen/Vorprüfungen abzulegen, indem man online studiert

Also im Laufe der durchgeführten Untersuchung kamen wir zu folgenden Ergebnissen:

An der Befragung nahmen die Studenten von 4-6 Studienjahres (Bachelor- 4. Studienjahr, Magister- 1., 2. Studienjahres), insgesamt 48 Menschen, daraus sind 3 Arbeitende. Im Laufe des Studiums waren alle als aktive Verbraucher von dem telekommunikativen lerninformativen System. Seit dem Anfang des Studiums wurden sie in einigen Unterrichtsstunden gebraucht, dazu wurde nur ein Teil des Unterrichts gewidmet und zu der selbständigen Arbeit nie gebraucht. Alle Befragten sind Verbraucher von TUIS. Es ist zu betonen, dass fast alle Befragten (95%) in Moskau wohnen und eine Möglichkeit haben, Unterrichtsstunden zu besuchen.

Auf solche Weise benoteten 75% der Befragten das Programm als negativ.

25% der Befragten gefiel die Idee mit Fernausbildung.

Indem man die Fernausbildung als negativ benotet, ließen sich die Befragten von folgenden Fakten leisten: die Fernausbildung fordert viele selbständige Arbeit und vor allem Selbstdisziplin. Da die territorialen Probleme den Befragten fehlten, stimmten sie dem Besuch von Lektionen zu.

Schlussfolgerungen:

Ausgehend von oben genannten und ungeachtet dessen, dass die Fernausbildung immer mehr in Russland an Verbreitung gewinnt, ist sie nicht besonders attraktiv für die in den Großstädten (z.B. Moskau) lebenden jungen Leute. Betonenswert ist auch die Tatsache, dass die Fachleute in nachhaltiger Entwicklung, die die Regionen untersuchen, empfehlen dort eigene Hochschulen entwickeln, obwohl sie die Möglichkeit der Fernausbildung nicht verneinen. Bemerkenswert ist auch das, falls der Auswahl von Studierenden „besuchen – nicht besuchen“, ziehen die Studenten vor, an der Vorlesung teilzunehmen, ungeachtet dessen, dass es manchmal sehr zeiterforderlich ist (bis zu 3 Stunden).

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**INTEGRATED APPROACH TO ESTIMATION OF
TYPOLOGICAL PECULIARITIES OF THE PERSON**

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Abstract: The article gives grounds of integrative approach in the assessment of the psychological and psychophysiological aspect of students' personality of various training specializations. It presents the research results of students' specific features of different educational and professional orientation – in the scheduled and non-scheduled (creative) activities.

Key words: integrative approach, personality, psychological features, psychophysiological features, psychological type of the personality, professional orientation, professional suitability, scheduled activities, non-scheduled activity, training profile.

Within the frames of the program for scientific research and innovations “Horizon 2020” the fundamental science defines the main strategies of the researches development of the brain in the European space, in particular the development of multidisciplinary interaction and appeal to the main social calls of the present. [3]

According to this program and reform of Russian educational system the estimated criteria to graduates are revised, in particular with updating of the demands of modern society. Expansion of the directions and profiles of preparation in the system of the higher education requires the formation of the corresponding competences from students

that is connected with the change of sociocultural conditions, change of valuable orientations, motives of training, students' social activity, etc. Besides, the introduction of professional standards determines the main professional graphic characteristics for graduates of different profiles of training that is defined by features of structure of the students' identity with various educational and professional orientation.

The organization of the identity of the modern person can be considered from a position of the different level approach assuming the analysis of the physiological, psychophysiological, psychological, behavioural and social parties. One more level – the highest, creativity level – has been allocated recently in studying of the personality. One of characteristics of this level is the ability to change the world around in a qualitative and over adaptable way. [2]

Methodology

The purpose of our research was to reveal typological features of the students' identity of various profiles of training. The conceptual basis of the research was made by the integrative approach to typological features assessment assuming complex studying of the personality at all levels of her manifestation (psychophysiological, neurodynamic and psychological).

Junior students (17–19 years old) and senior students (20–22 years old) of higher education institutions of Chelyabinsk, Yekaterinburg (Russian Federation) and Kostanay (Republic of Kazakhstan) have participated in the research. The general selection consisted of 499 examinees and has been divided into two groups. Students with educational and professional orientation on the regulated activity – students on profiles of not creative orientation have entered the first group. The second group was represented by the students with orientation on independent (creative) activity. The regulation of activity is defined as existence of the algorithm of educational and professional actions assuming strict following to the set sequence of actions and operations with the minimum assumption of manifestation of own initiative or imagination.

The procedure of the research included several stages. At the first stage the students' mental sphere was explored by means of the psychodiagnostic techniques aimed at studying the structure of the personality according to a systemic and functional approach: diagnostics of activity, motivation, orientation, self-control, valuable

orientations, and predispositions to a certain type of professions. Further the analysis of indicators of power metabolism of the brain, in particular, the registration of the level of constant potential (LCP), express diagnostics of the person's working capacity and a functional condition was carried out. The obtained data were checked by means of methods of mathematical statistics.

Results

The results of the research have confirmed the validity of differentiation of the examinees' selection on the types according to specifics of educational and professional orientation. Among the students with creative activity orientation of training the share of the persons of an artistic type of the personality dominates (64,41%). The leading motive of training is "knowledge acquisition" while the sphere of hobbies is a priority. Among students with educational and professional orientation on the regulated activity the share of persons of a social type of the personality dominates (61,98%). So the leading motive of training is "mastering a profession" and the sphere of public life is a priority.[1]

The specifics of an educational activity determined by a training profile is reflected in the indicators of the level of constant potential (LCP) of the brain. The range of an extremely overestimated UPP (from 40 to 70 mV) is taped at an authentically larger number of examinees with educational and professional orientation on independent (creative) activity. The range of the UPP optimum values (from 7 to 15 mV) is taped at an authentically larger number of examinees with the regulated activity orientation [1].

Authentically most part of the examinees in both groups showed slightly reduced and normal working capacity on the indicators of working capacity and fatigue. The share of persons at whom the fatigue is noted was authentically lower in group of the students studying on creative specialties. The mobility of nervous processes is typical for authentically most part of the students examined in the group with independent educational and professional orientation. In the group of students with educational and professional regulated activity orientation a share of persons with inactivity in 5 times more, than students with mobility of nervous processes. For authentically most part of the surveyed students in this group the average level of mobility of nervous processes is characteristic. [1]

Statistically significant correlations of an average ($0,5 < r < 0,69$) and moderate strength ($0,3 < r < 0,49$) at $p \leq 0,01$ have been revealed between the type of personality and such indicators as the threshold of activity, orientation, motivation for learning, structural levels of the motivational and need sphere, terminal values, life spheres, self-regulation.

Statistically significant positive correlations of an average strength ($0,5 < r < 0,69$) at $p \leq 0,01$ have been identified between indicators of the level of the permanent brain potential (SCP) and the latent period of a simple visual-motor reaction in all the examinees regardless of the profile of training.

Also statistically significant correlations of an average ($0,5 < r < 0,69$) and moderate ($0,3 < r < 0,49$) strength at $p \leq 0,01$ have been found out between the indicators of the level of the constant potential and the psychological characteristics of the personality studied in the presented model of complex diagnostics: personality type, activity threshold, orientation, learning motivation, structural levels of MPS, terminal values, life spheres, indicators of self-regulation.

In conclusion

Two-third of the examinees according to their typological features correspond to training profiles and their revealed typological features can be considered as professional and graphic characteristics.

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**THE BENEFITS OF BLOGS IN THE 21ST CENTURY LANGUAGE
CLASSROOM**

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Abstract. Web 2.0 seems to have the potential to meet the needs of today's young people at a number of different levels. It is also in line with a growing trend toward student-led collaborative learning where teachers adopt a supportive role. The article looks at some of the key benefits of blogging in the modern language classroom.

Key words: Web 2.0; blogs, blogging, language learning; collaborative learning; student-centred instruction

Introduction.

The purpose of article is to outline some of the key benefits of using blogs in the modern language classroom. Web 2.0 can be defined as “a second generation, or more personalised, communicative form of the World Wide Web that emphasises active participation, connectivity, collaboration and sharing of knowledge and ideas among users.” [7: 665]. Learners are now increasingly seen as “prosumers”. It is suggested that Web 2.0 provides opportunities for creating social constructivist learning environments and promotes student-centred instruction.

Materials. Blogs have been used extensively for foreign and second language learning as they are assumed to provide a genuine learning context for learners who have limited opportunities to be exposed to the target language in an authentic environment. At its most basic, a blog as one of Web 2.0 services allowing learner interaction through comments can be defined as a ‘personalized webpage, kept by the author in reverse chronological diary form’ [5: 2]. Campbell [4] identifies three kinds of blogs, the tutor blog, the learner blog, and the class blog.

Benefits of blogging. Language students can benefit from blogs both as readers and writers.

Firstly, blogs provide students with authentic input by exposing them to reading, writing, listening and speaking [2].

Secondly, writing a blog enables students to use language for a genuine communicative purpose, transforming familiar pedagogical tasks into exiting projects in the new medium of the Internet. However, this effect might be short-lived. When the novelty wears off, students are likely to lose their initial interest and motivation. It follows that teachers should think of some ways to sustain high levels of interest and motivation. Regular blogging is also said to encourage more autonomous learning. Students need to be able to work independently, make their own decisions, and take responsibility for their own learning.

In addition, blogs can provide learners with “continuous feedback on their developing language through comments from classmates, teachers and possibly even native speakers” [1: 33]. However, in order to elicit high quality feedback, students need to provide high quality content. In other words, they are expected to communicate their thoughts clearly, make connections between ideas, synthesize information from various sources, as well as make their posts visually pleasing. This, in turn, may boost their critical and writing skills. In fact, when students discover that they have an audience, they are more likely to choose their words with care. In fact, blogging can be seen as “a highly productive, communicatively meaningful and effective approach to helping students refine and develop their language skills” [3: 17]. According to Hyland [6: 150], while writing involves individual effort, there are clear benefits to students sharing both their texts and experiences. Finally, there is some evidence to suggest that L2 blogs can be perceived as protected spaces in which students feel in control and in which they can find like-minded people. All these factors create a willingness to communicate. This can be particularly beneficial for shy or introverted students. It may help to reduce the stress students often feel in face-to-face contexts. Reading other students' blogs and commenting can bring a sense of community and help students to overcome learning anxieties. Tutors could also post practical tips or useful links to give additional support.

Conclusion. Blogging can help to develop transferable skills necessary to succeed in an international context and overcome certain communication barriers. To promote discussion, students could be asked to share their thoughts via their personal blogs as well as read and comment on their classmates posts. Thus, blogging may contribute to

supporting diversity, inclusion and equality. Its impact therefore reaches far beyond the classroom.

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**INTERNATIONAL COOPERATION ON THE "GREENING"
OF CURRICULA AND PROGRAMS**

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Abstract. The article describes international cooperation of universities in Russia, Germany and other countries with the goal of greening the curricula within the framework of the program for introducing ideas of sustainable development into educational programs. The main directions of cooperation for achieving these goals are described. An example of the successful implementation of modern programs and techniques in the practice in the Mining institute of NUST "MISiS" is given.

Key words: international cooperation, sustainable development, green curricula, environmental, ecology, educational programs.

Introduction. As the main direction of the idea of sustainable development at the United Nations Conference "Rio + 20" in 2012, the improvement of people's quality of life and the achievement of long-term prosperous development were determined. This implies solving social and economic problems on the principles of a "green" economy and "sparing", "responsible" nature management.

The transition to sustainable development can not be achieved by maintaining the current management stereotypes in production areas that allow low industrial enterprises' low social responsibility for preserving the quality of the environment and its restorative capacity. Therefore, universities and other higher educational institutions play a large role, which should promote the policy of education and professional training based on the modern concept of sustainable development.

The task of the higher education system is to make vocational training a real tool that provides for the transition to integrated management methods, while taking into account economic, social and environmental problems. To this end, universities should consolidate efforts to strengthen training programs, focus them on raising awareness and addressing knowledge gaps related to the implementation of the idea of sustainable development, and include the rational use of environmental resources in all relevant training activities.

The creation of a network of partner universities that sympathize with the ideas of sustainable development will help to accelerate the large-scale transition to new learning approaches to the formation of knowledge and skills - the transition from the simple transfer of knowledge and skills necessary for the performance of certain professional functions, to training the readiness to perform these functions conflict-free for nature, ability to foresee the impact of management decisions on natural ecosystems and social structures. Graduates of universities should not only become good professionals in their field of activity, but also be able to practically take into account the ever growing problems of the environment and development in all functional areas of governance, especially at strategic levels.

Recognizing their responsibility to create a new generation of young people, following the ideas of sustainable development, a network of universities of emerging economies was created at the initiative of the Brandenburg Technical University to jointly solve this problem. From Russia, NUST "MISiS" took part in this program. On the basis of the Faculty of Economics of the Brandenburg Technical University and the Mining Institute of the NUST "MISiS" a working group was created to implement the program of promoting sustainable development ideas in our universities.

Analyzing international experience in education for sustainable development, three main approaches to organizing the process of greening basic education programs in non-environmental specialties were identified:

- Disciplinary, which introduces an integrated environmental discipline;
- multidisciplinary, implying the inclusion of multidisciplinary blocks of topics on sustainable development in traditional curriculum disciplines;

- interdisciplinary, which introduces a new course of ecological orientation while simultaneously ecologizing traditional training courses and disciplines.

In particular, for the countries with transitional economy, the expansion of training in environmental certification and eco-labeling is of particular importance, which will make it possible to intensify the trend of voluntary transition of enterprises to European and world environmental standards, with an emphasis on rational mining of minerals. Specialized programs in this area should include the study of modern systems and methods of environmental certification, especially for compliance with special (industry) environmental standards.

The work on reorienting vocational education to the issues of sustainable development is so difficult and large that for its tangible success in the short term it is necessary to apply new forms of training that will help to inform the students of different specialties integrated knowledge in the sphere of sustainable development at a consistently high quality level. In this context, this form should be a distance and on-line education.

The creation of a mechanism of consolidation and solidarity of partner universities on the basis of joint scientific research, regular discussions and consultations allowed the development of unified methodological approaches. This allowed to get a whole range of joint and personal benefits, as well as to overcome many difficulties and barriers to the implementation of sustainable development ideas in higher education.

Thus, in the context of the above problems, the most promising areas of cooperation between Brandenburg Technical University and NUST “MISiS” were recognized as follows:

- Methodological work on multidisciplinary integration of sustainable development aspects in a wide range of curricula not directly related to environmental protection (for example, economics, law, engineering, mining, etc.);
- Working together to create and expand an international network of universities working towards the greening of curricula and programs;
- Development and introduction of interdisciplinary modules on-line and distance learning on topics related to sustainable development;

- Creation of the International Scientific and Methodological Center EcoKampus for Sustainable Development and Voluntary Certification on the basis of the Institute of Mines "MISiS";
- Work on the implementation of selected disciplines and specialties with training in English in Russia;
- Increase the level of environmental competence and potential of students, including in accordance with the principles of the Bologna Process;
- Raising the qualification of the teaching staff.

Conclusion. To date, the staff of the Faculty of Ecology of the Brandenburg University has prepared a methodical and program complex for integrating the ideas of sustainable development into the educational programs of universities. The complex has already been tested in universities by partners including the Mining Institute of NUST "MISiS".

Electronic resources provided by the Brandenburg University are actively used in the process of training students of all specialties of the Mining Institute. Especially widely it is used at the department of mining and industrial ecology.

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Spichko N.A., I.V. Pushinina², R.G. Kaderova³
**ECOLOGICAL APPROACH TO LANGUAGE TEACHING:
LEXICOGRAPHICAL ANALYSIS**

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Abstract: The article dwells upon the necessity of modernizing language teaching in higher institutions, integrating elements of ecologically friendly content into the courses of foreign languages. Eco-vocabulary presented in lexicographical sources is analyzed.

Key words: ecological culture, sustainability, ecological vocabulary, language teaching.

Ecological approach to language teaching is closely related to the global problem of sustainable development for the sake of future generations. It is important “to see interconnectedness” [1, p.16] of all the component systems of global sustainability. This problem is also important nowadays because ecologically friendly attitude is widely accepted in the European society. The necessity of the research is determined by the fact that with the rapid development of the ecological world a graduate faces the linguistic environment, which is a complicated and diversified phenomenon [9, p.54]. Consequently, personal and professional spheres of communication are linked, touching upon such topics as health, economic and social interests, etc. The main target of this work is to focus on integrating ecological material into various topics studied in the course of language studies in higher institutions. Our vision is that it can be done with the help of

working on the “ecological” vocabulary (presented in this research via the lexicographical approach).

Having analyzed a number of English and German lexicographical sources, it is possible to present alongside with the meaning of the word *ecology* itself a list of commonly used terms with *eco-öko-* or *ecology/ ökologie* elements. The word *ecology* itself has a long history. As a noun, *ecology* was first used in 1873 (*oecology*) in the meaning of “branch of science dealing with the relationship of living things to their environments” [2]. It was then introduced in the German language as *Ökologie* by German zoologist Ernst Haeckel. The prefix *eco-* comes from Greek *oikos* which meant “house, dwelling place, habitation” (from Proto-Indo European root **weik-* which was equal to “clan” and *-logia* which was equal to “study of”) [7]. The dictionary states the usage of this word since anti-pollution activities from 1960s. These data give an idea that ecology is equal to the environment, and environment is literally “*The house we all live in*”.

We have done a lexicographical research of 3 online and 3 printed dictionaries (English and German) and tried to compare the word families of the word *ecology* represented in these dictionaries.

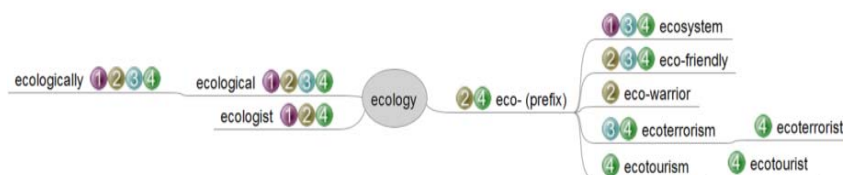
The dictionaries were divided into two main groups:

1) having a similar representation of word families (CCELD, LDELC, MEDAL and CamED);

2) representing a wider word family (OED, Duden).

Let's look at the word family of the word “ecology” from the first group of dictionaries (Picture 1).

Picture 1. Representation of the word families of the word “ecology”



*The numbers in Picture 1 stand for the dictionaries analyzed:

1 – CCELD - Collins Cobuild English Learner's Dictionary;

2 – CamED - Cambridge English Dictionary Online;

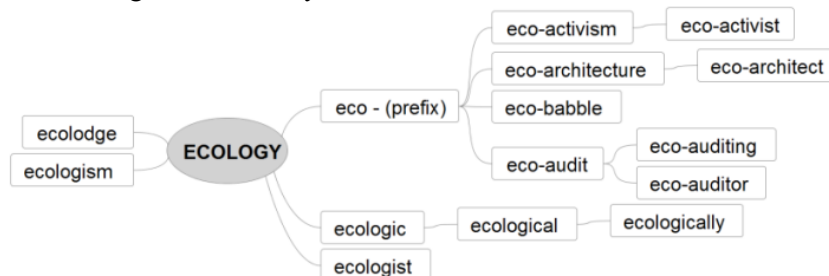
3 – LDELC - Longman Dictionary of English Language and Culture;

4 – MEDAL - Macmillan English Dictionary for Advanced Learners.

The united word family presented in Picture 1 consists of 12 elements, only 3 of which (including *ecology*) are used in all the dictionaries. Particular interest can be given to the word *eco-warrior* from CamED, as the definition for it states that it is “someone who tries to stop activities that damage the environment” [2]. It can make students think that ecology should be protected nowadays by the actions like those of the war. We can also state that the doers of the action connected with ecology both positively and negatively (*eco-warrior*, *ecotourist* and *ecoterrorist*) are stated only in one dictionary each, which means that actions (like *ecoterrorism*) are more popular and, probably, more important in the English language than the performers of that action.

Let’s turn to the second group and analyze first the word family of Oxford English Dictionary [OED] (Picture 2) and then compare English and German lexical units with *eco-/öko-* or *ecology/ ökologie* elements (Picture 3).

Picture 2. Representation of the word families of the word “ecology” in Oxford English Dictionary

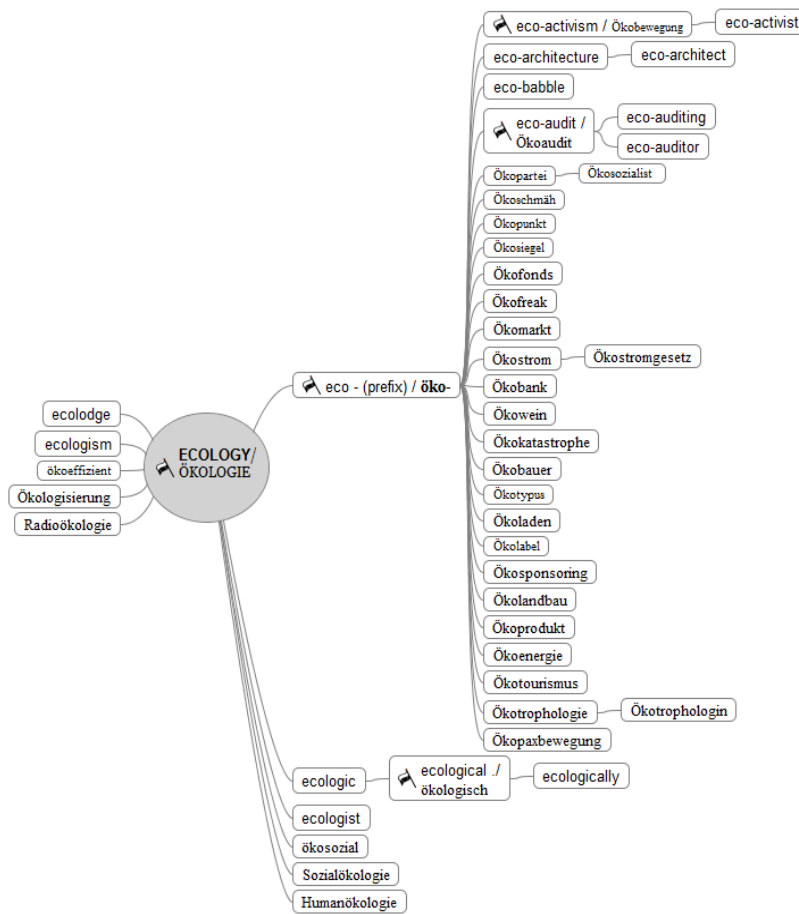


In comparison with Picture 1, the data are more numerous and representative. OED presents 11 nouns (5 denoting actions and 4 doers of those actions), 1 prefix, 2 adjectives and 1 adverb. It’s necessary to notice that most of its lexical units are not represented in any other dictionary analyzed.

Picture 3 (given below) shows English and German lexical units comparatively. It becomes clear that the number of German nouns with the prefix *-öko* prevails as the reason for it can lie in the ability of

German to construct compound nouns by simply adding words to one another.

Picture 3. The word groups in the English (from OED) and the German (from Duden) languages



The studied dictionary entries can be divided into groups based on the criterion of their meaning.

A. Nouns denoting activities, related to ecology: in English: *eco-activism*, *eco-architecture*, *eco-audit*, *eco-auditing*, *ecologism*,

ecolodge and *eco-babble*; in German: *Ökologisierung*. It's worth mentioning that there is no direct connection in the meaning between the words *ecologism* and *Ökologisierung* despite the main idea of an activity connected with ecology.

B. Nouns, representing the doers of the action: in English: *eco-activist*, *eco-architect*, *eco-auditor* and *ecologist*; in German: *Ökosozialist*, *Ökotrophologin*. If the first three English meanings are clear as they are connected with the activities above, the last requires more specific information. *An ecologist* is “an expert in or student of ecology” [8]. On the other hand, German words have political or medical character as *Ökotrophologin* is a dietician (so it's clear why the word is feminine in German).

Summing up, on the basis of the comparative analysis of the studied items, it can be concluded that the amount of nouns containing the element *eco-* prevails among nouns in both languages, adjectives are represented in a limited number and there are no verbs. It is also necessary to underline that the analyzed items are not specific for studying only in ecological topics, but have become widely accepted terms. It should be also noted that ecological education through language teaching creates an up-to-date ecologically motivated person, developing the students' curiosity, communicative and professional competences. In general, changes in the world and new demands to graduates determine the necessity to modernize approaches in language teaching.

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**COMMUNICATIVE FOREIGN LANGUAGE COMPETENCE IN
CROSS-CULTURAL SCIENTIFIC COMMUNICATION**

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Abstract: Foreign language competence is a condition for the success of intercultural scientific communication. The formation of this competence assumes the modeling of scientific communication in the learning process.

Key words: environmental education, ecologist researcher, professional competence, cross-cultural scientific communication, professional foreign language communicative competence

Introduction. Environmental education increasingly focuses on the formation of specialists who know a foreign language, have a professional foreign language competence as a means of achieving mutual understanding in spoken and written scientific communication. The object of the article is teaching foreign-language scientific communication. The subject of the article is to define the professional foreign language communicative competence of the ecologist and to present the model of its formation.

Methodology. A communicative competence is determined in accordance with the FSES direction. Consider this concept in the example of FSES "05.06.01 Earth Sciences". In accordance with the

FSES "05.06.01 Earth Sciences", postgraduate education in an environmental profile includes a set of competencies. One of them is a professional communicative foreign language competence [1,2,3,4,5]. The definition of professional foreign-language communicative competence (PFLC) is formulated in the context of universal competencies: "readiness to participate in the work of Russian and international research teams in solving scientific and educational problems (EC-3); readiness to use modern methods and technologies of scientific communication in the state and foreign languages (EK-4)" [6]. PFLC of an ecologist-researcher is the ability of the graduate student to perform in the mode of secondary linguistic personality in the scientific and professional situation of communication with colleagues/partners from other countries and the readiness to carry out intercultural scientific and professional interaction in the multicultural space in the field of ecology.

According to the complex goals of training, the tasks of teaching the discipline "Foreign Language" in postgraduate study of the ecological profile are determined as:

- the formation of readiness to perceive and understand foreign scientific information, foreign scientific picture of the world;
- the formation of the ability to generate and perceive scientific environmental discourse in the process of scientific and professional activities;
- the formation of the ability to overcome communication barriers to achieve scientific and professional goals;
- mastering certain cognitive methods, allowing to perform cognitive and communicative activities;
- development of individual psychological characteristics and abilities of interpersonal scientific interaction;
- the formation of educational and compensatory skills, as well as the ability for constant self-improvement;
- stimulating the intellectual and emotional development of the individual;

The content of training is maximally correlated with future professional research activities and is set by the situations of scientific communication.

An analysis of the intercultural scientific communication of ecologists allows us to determine its components and build a learning

model focused on spoken and written forms of scientific communication and presented in the learning process as mutually complementary modules.

Scientific communication of the ecologist-researcher that is written in a foreign language includes abstracting and annotating, the translating of scientific literature of an environmental profile, the writing of scientific reports, articles on the topic of research and business correspondence in research activities.

Oral scientific communication of ecologists is represented by such components as presentation with a report / a report on the topic of scientific research (with multimedia support); conducting scientific conversations, discussions; interpreting of conversations, scientific presentations, reports, discussions of scientists-ecologists.

Accordingly, the following modules are included in the training model: annotating and abstracting (written and spoken) of scientific texts of the ecological profile, scientific report, scientific discussion, business correspondence, scientific translation (written, spoken).

An important factor in determining the nature of the training materials is the ecological profile of the training "05.06.01" Earth Sciences "[6], the specific topic of the dissertation research of a graduate student-ecologist. That causes the inclusion of highly specialized texts of environmental themes in the learning process.

Results and conclusion. The application of this model in practice for a number of years has shown its effectiveness, which is confirmed, in particular, by the publication activity in foreign languages in the materials of scientific conferences and journals, as well as speeches with reports and reports at conferences, participation in scientific discussion during plenary and parallel sessions[7,8].

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**COGNITIVE TRAINING AS
A PSYCHOLOGICAL CONDITION
DEVELOPMENT OF VISUAL THINKING OF
SCHOOLCHILDREN**

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Abstract: The paper focuses on cognitive training as a psychological method of developing visual thinking of schoolchildren. The psychological structure of the training is considered in the research.

Key words: visual thinking, schoolchildren, development of visual thinking, cognitive training, psychological condition.

Introduction

In the modern world of high technologies, information production is much ahead of its consumption. In the conditions of technical progress and rapid dissemination of information, it is important to learn how to use all cognitive resources in a comprehensive and full-fledged way in order to qualitatively perceive it. It's about visual thinking. Visual thinking plays an important role in human activities. Visual thinking is indispensable where it is necessary to convey to other people any ideas in such a way that others can quickly understand and accept them [2].

Methodology

As a result of the analysis of publications, we came to the conclusion that there is a diversity in the views of scientists on the methods and means by which the development of visual thinking is carried out. In the scientific and popular science literature, visual thinking is proposed to develop by various means such as art (R.Arnhneym, A. Hauzen, L.S. Vygotsky, V.I. Zhukovsky, L.V. Lagun, N. Molodtsova, I.A. Serikova, L.N. Solodovichchenko), "visual management" (D.Roem), mathematical disciplines (N.A. Reznik, V.A. Dalinger, O.O. Knyazeva) and others.

Based on our own experience and understanding of visual thinking, we propose our own method of developing visual thinking in

schoolchildren. Visual thinking is a kind of thinking activity that provides visualization of information (both verbal and visual) by translating the verbal elements of this information into visual images and displaying them, eventually, as images.

Based on our own experience and understanding of visual thinking, we propose our own method of developing visual thinking in schoolchildren. Visual thinking is a kind of thinking activity that provides visualization of information (both verbal and visual) by translating the verbal elements of this information into visual images and displaying them, eventually, as images.

We will assume that the process of development of visual thinking will be most effective if as a psychological condition cognitive training is delivered, by which we mean a purposeful, specially organized psychological service in the school environment, the process of developing visual thinking.

Results

Training of visual thinking is carried out in two forms. First, in the form of mini-training. This type of training is implemented as follows. During the lesson in fine arts, a few minutes are given to the training exercises. For example, the exercise «Visual grouping». In carrying out this exercise, the student learns to think through visual grouping of objects, which will help him create a generalized pictorial image, without concentrating on unnecessary details. Thus, drawing the crown of a tree, there is no need to draw each sheet separately, drawing it as a «spot». Secondly, the training with the fifth graders is conducted within the framework of classes with children organized by the school psychology service in cooperation with the teacher of fine arts. Under the training of visual thinking, we mean a system of tasks aimed at developing and improving various ways of visualizing information. Based on the most common understanding of visual thinking as «the ability to think with visual images», we developed a cognitive training program. It is based on the results of psychological research: first, the data on the dynamics of the development processes of individual operations of visual thinking, such as analysis, synthesis, image verbalization [1]. Secondly, we used a system of intellectual operations developed in psychological science, based on the correlation operations with mental cognitive processes [3, p. 34]. So, within the framework of perception, memory and thinking, such operations as association

«establishment, «structuring perceptual actions», «ordered scanning», «juxtaposition», «discrimination», «comparison», «analysis», «synthesis», «generalization» [3].

Based on the results of these studies, all the tasks and exercises of our training, aimed at developing visual thinking, we have divided into three blocks, or, in three stages: pre-primary, basic, general development. At each stage certain goals and tasks were set. The tasks of the first stage are the development of visual actions and operations that arise and are manifested in the framework of the processes of representation, perception, and memory. Games, tasks and exercises at this stage are designed to develop spatial representations, figurative, metaphorical associations, spatial perception. Among them: «Visual contrast», «Kaleidoscope», «Visual calendar». The goals and objectives of the next block, the main one - the development of visual logic, analytical abilities, comparison, classification, encoding / decoding operations, symbolization. The content of the main stage is represented by visual games and exercises. For example, «Express a symbol», «Visual dictionary» and the game «Visual story». Visual elements are randomly distributed. It is necessary to arrange them in a certain logic. Here the problems of the development of visual logic and mental operations of generalization are being solved. The third block (stage) of the training is general developing. At this stage, there is a development of general visual creativity and the overall visual competence of the student.

In conclusion

Thus, we assume that psychological cognitive training will contribute to the effective development of visual thinking of schoolchildren.

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**THE PROBLEM OF THE INDIVIDUALIZATION OF THE
PROCESS OF STUDENT TRAINING OF STUDENTS OF
PEDAGOGICAL HIGH SCHOOL: SUCCESSES AND
PROSPECTS**

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Abstract: In recent years in professional education changed the functional, structural, and substantive components of the educational system. Multi-level system of professional education offers opportunity to student choosing of professional development within the chosen profile that can be realized through tutorial support. In modern conditions the process of the development within the chosen profile that can be realized through tutorial support. These instruments are based on the organization of tutor support's innovative activities in the conditions of continuous professional education, and have a huge potential.

Key words: tutor support, individualization, individual educational plan, professional development, professional standard, students of pedagogical profile, techniques of open education, variable educational sphere, student.

Modernization of education and orientation to the demands of the labor market, entry into the Bologna process, approval of the standards of the third generation, orient the higher school to increase attention to the self-educational activities of students. In higher education in recent years, there have been changes affecting the functional, structural, and substantive foundations of the education system. The emphasis shifts to the formation of professional competence as an integral characteristic, based on the student's personal resources and formed with the support of the student's individual experience. All this assumes the variability of training trajectories within the chosen profile. Thus, the modern student has the opportunity to choose a lot: a life position, views, outlook, style and strategy of life (K.A. Abulkhanova-Slavskaya, R.A. Zobov, V.N.

Kelasiev, A.A. Kronik, K. Rogers, E. Fromm, and others). At the same time, practice has shown that students are not always ready to act effectively in conditions of multiple choice, to devote their own strategy of professional self-development and formation. In these conditions, there is a need for the construction of a pedagogical process that ensures the coordination and integration of the educational and upbringing efforts of the individual and the university, the use of various pedagogical techniques to develop an individual route for the professional development of the student.

At the present stage of the development of education, the school needs a teacher capable of consciously building up its professional activity, and also able to design an individual educational route for the learner, focusing on the subjectivity of each child [2]. The process of teaching students at a university should be based on the principle of individualization, where each student has the opportunity to build his own individual educational trajectory to master the knowledge that is important to him at the moment.

Practical activity on the disciplines of the psychological-pedagogical cycle that the student needs to determine his individual meaning and the cause of the educational process becomes topical. It is important to help the student determine their own educational trajectory, as well as the ability to predict their own results. The student should realize the significance of the traversed route, be able to change it, or choose another vector depending on the adjusted goals, viewing all possible options [3].

When constructing a set of tasks for the disciplines of the psychological and pedagogical cycle, we focus, among other things, on the interests of students, the design of the pedagogical process on the basis of modern pedagogical technologies, and the construction of an open educational environment for the development of the innovative thinking of the very future teacher.

In the process of implementation of the ballroom system at the lessons of the disciplines of the psychological and pedagogical cycle, conditions are created that allow the student to build an individual educational trajectory of movement in the discipline, which will make it possible to realize the student's personal potential. Within the limits of the fixed general requirements in the position on the ballroom-rating system of the university (forms of control, correspondence of the sum

of the points scored to the assessments of the traditional system, the proportion of points for the current work in the semester and scores for the exam, etc.) the teacher builds a set of specific requirements for the level of development his discipline and formulates a set of tests during the semester. Thematic planning is developed, which specifies the forms of control and the maximum possible score for this type of activity. The curriculum of the discipline under study is aimed at mastering the professional competence and ensures the formation of basic competences irrespective of the profile of training.

In the process of implementing the developed individual educational trajectory of the movement according to the discipline, individual traits of the trainees are taken into account, where they have the opportunity to work at the individual pace of promotion under the program and independently choose the variant of tasks.

The new Federal State Educational Standard of general education refers at all levels to the need to implement the principle of individualization in learning. The variety of tasks of different modules of the ballroom-rating system, the stage-by-stage preparation for them, the implementation of various types of projects, will allow the student to master by his own experience all the declared stages.

The introduction of the principle of individualization in the learning process continues the general line of development of the education system, focused on building a variable educational process and the formation of professional competence as an integral characteristic of the individual. The individualization of the learning process is considered, first of all, in the context of consultative and diagnostic assistance, as an instrument of upbringing and development that ensures the preservation and maintenance of the trainee's subject position and allows to mitigate the state of frustration associated with activities in conditions of multiple choice and high degree of uncertainty.

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BOOSTING READING COMPREHENSION IN SECOND LANGUAGE ACQUISITION

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Abstract: The article looks at the facts of grammar and vocabulary techniques that are instrumental for learners of foreign languages in understanding the key concepts and grasping the message of the text.

Key words: reading skills, reading comprehension, second language acquisition, vocabulary development.

Introduction. Many second language learners often fail to understand the key concepts and grasp the message of the text. High prior knowledge of key vocabulary of a text often means higher scores on reading comprehension.

Methodology. There is no doubt that grammatical knowledge is crucial in native and nonnative reading and there is a relationship between reading ability and the ability to complete anaphoric relations in a cloze text, so mastery of such textual features, including cohesive ties is a central factor that influences reading and reading comprehension [2].

Foreign readers of English texts often tend not to pick up on conjunctive words in their specialized texts, thus nonnative readers read more locally than do native speakers and because they do not attend to conjunctive ties, they have trouble synthesizing information across sentences and paragraphs [3].

It is believed that recognition of conjunctions and other intersentential linguistic devices is crucial to the information gathering skills of second language readers. Thus, enhancing second language readers' decoding skills should include classroom instruction on the cohesive devices of English, and their function across sentences and paragraphs. Such instruction can make learners aware of how ideas in a text are unified by these cohesive elements [5].

Studies of both cohesion and coherence in advanced ESL learners' writing discovered that although advanced ESL writers use about the same proportion of cohesive devices as native writers, they lack the variety of native writers. Thus ESL writers tend to overuse repetition and underuse synonyms and collocation. This is usually attributed to general deficiencies in ESL learners' vocabularies, and comments that this appears to be related to similar results with good and poor native English writers [1].

Vocabulary development and word recognition have long been perceived as crucial to successful decoding skills. Unlike traditional views of vocabulary, current thinking converges on the notion that a given word does not have a fixed meaning, but rather a variety of meanings around a "prototypical" core, and that these meanings interact with context and background knowledge [1].

Comprehension studies in both first and second language reading employing prereading instruction in word meaning have been both successful and unsuccessful in establishing a significant effect. Preteaching vocabulary in order to increase learning from text requires that words to be taught must be key words in the target passages, that words be taught in semantically and topically related sets so that grasp of word meaning and background knowledge improve concurrently, that words be taught and learned thoroughly, and that only a few words be taught per lesson and per week. Attempts to teach words meanings without determining that they are key to the target passages, without establishing word meanings and background knowledge concurrently,

and without teaching words thoroughly are probably doomed to failure, as are attempts to teach extensive amounts of words [1].

Results. We agree that merely presenting a list of new or unfamiliar vocabulary items to be encountered in a text, even with definitions appropriate to their use in that text, does not guarantee the learning either of the word or of the concept behind it. Furthermore, it does not guarantee improved reading comprehension of the text passage [5]. Sometimes vocabulary instruction prior to or concurrent with reading the target passages failed to produce any noticeable facilitating effects on the reading as compared to no vocabulary instruction [4]. We also hold that to be effective an extensive and long-term vocabulary development program or background knowledge development program is called for.

Thus we should organize students' reading activity so that new knowledge and vocabulary could evolve from the previously learned ones. It implies that the target text meant for reading, study and viewed as a tool to enlarge students' vocabulary and background knowledge should probably be followed by the following sets and tasks: **Prereading activities** → **Commentary (preferably with a cultural twist)** → **Vocabulary list** → **Comprehension questions** → **'Vocabulary study'** section that involves tasks requiring paraphrasing, consulting dictionaries, supplying certain words or phrases from the text → **'Discussion section'** consisting of "Agree or disagree tasks", tasks requiring skimming extra texts to answer questions.

Conclusion. In our opinion the listed activities may enhance background knowledge relevant to the reading material in second language reading classes and help the learners to see how to make use of and apply information in different situations.

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METHODS OF IMPROVING THE PROGRESS OF PUPILS (ON THE EXAMPLE OF COMMUNICATIVE PEDAGOGY OF GERMANY)

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Zusammenfassung: Der Einfluss der modernen Methoden auf die schulische Leistung der Lernenden kann sehr groß sein. Vieles hängt von den Lehrern ab: sie benötigen ein breites Spektrum an Methoden und die Kompetenz, ihre Methoden auf Wirksamkeit untersuchen zu können. Bereitschaft für einen offenen und konstruktiven Dialog ist die wichtigste Aufgabe im Bereich „Unterrichten“.

Schlüsselwörter: direkte Instruktion, kooperatives Lernen, Rückmeldung, bewusstes Üben, Bewertungen des Unterrichtsprozesses, Medien.

Abstract: Influence of modern methods of teaching on school progress is big. A lot of things depend on the teacher: he needs a wide range of methods and ability these methods to use effectively. Readiness for open and constructive dialogue - the main objective of successful teaching.

Key words: direct instruction, cooperative training, the automated skill, feedback, teaching process assessment, media means.

Der Einfluss der modernen Methoden auf schulische Leistung der Lernenden ist sehr groß. Er ist abhängig von der

Möglichkeit, wie Lehrer damit arbeiten können. Je strukturierter und klarer die Methoden sind, desto erfolgreicher lassen sie sich durch Lehrer umsetzen [1, 22].

Direkte Instruktion ist eine Form des Unterrichts, in der der Lehrer bestimmte Ziele erreichen will und die Schüler bewusst zu ihnen bringt. Die Lektion ist, dass sowohl der Lehrer als auch der Schüler genau wissen, wer / was / wann / warum / wie / wo / mit wem sie es tun sollen. Diese Form des Unterrichts ist besonders nützlich für schwache Studenten; Sie brauchen klare Richtlinien (Anweisungen). Diese Methode wirkt sich effektiv auf die schulische Leistung aus. Sie kann sowohl im offenen als auch im geschlossenen Unterricht präsentiert werden. Sie zeichnet sich vor allem durch die Klarheit von Zielen, Inhalten, Medien, Raum, Zeit sowohl auf Seite des Lehrers als auch auf Seite des Schülers aus.

Kooperatives Lernen ist eine Form des Unterrichts, wenn sowohl der Lehrer als auch der Schüler wissen, was in der Lektion gesagt wird, was zu tun ist und was als Nächstes zu tun ist. Man sollte auf die folgende Bedingung achten: Je älter der Schüler ist, desto höher ist die Effektivität des kooperativen Lernens. Jeder weiß, dass es für die Schüler in einer Grundschule viel schwieriger ist, sich auf Lehrmaterial zu konzentrieren, Stille zu lernen, miteinander zusammenzuarbeiten. Das bedeutet nicht, dass kooperative Bildung in der Grundschule bedeutungslos ist. Im Gegenteil, die Grundschule legt den Grundstein für die Entwicklung des kooperativen Lernens.

Rückmeldung ist einer der am besten erforschten Faktoren des Einflusses auf das Gelingen des Unterrichtens. Es ist kompliziert, auf die Frage zu antworten, welche Art der Rückmeldung den starken Einfluss auf die Schulleistung leistet. Die Rückmeldung wird in vier Stufen gebaut: die Aufgabe, der Prozess, die Selbstregulation und die Selbstständigkeit. Die erfolgreiche Rückmeldung soll drei Schlüsselfragen entsprechen: Wohin gehst du? (welche Ziele), Wie kommst du voran? Wohin geht es als nächstes? Entscheidend ist die Rolle der Fehler dabei. Die Fehler darf man nicht als etwas Schlechtes oder als etwas zu Vermeidendes wahrnehmen. Die Fehler sind der Teil des Lehrprozesses. Das Recht auf den Fehler haben auch die Lehrer. Die Analyse des Unterrichts führt vor, dass man ohne Rückmeldung

der Schüler die hohen Ergebnisse nicht bekommen darf. Nur der Schüler kann mitteilen, ob er das Lehrziel erreicht hat, ob er den Inhalt des Themas verstanden hat, ob er die angebotenen Methoden ausnutzen konnte, ob er mit den Medienmitteln zurechtgekommen ist, ob es der abgeführten Zeit auf die Ausführung der Aufgaben genug war. Wenn der Lehrer diese Informationen bekommen hat, kann er die folgende Beschäftigung begriffen aufbauen. Die Rückmeldung ist für den Lehrer, als auch für den Schüler notwendig. Die Berücksichtigung der Fehler wird wie die Weise des Ausdruckes der pädagogischen Kompetenz betrachtet. Die Lehrer brauchen eine öffentliche und schulische Lernkultur, in der die produktive Rolle von Fehlern genutzt werden kann.

Bewusstes Üben kann man folgenderweise charakterisieren: erstens ist es mit dem Niveau des Wissens und der Stufe der Schwierigkeiten der gestellten Aufgaben verbunden; zweitens ist es vielfältig, hat mit einem Drill nichts zu tun (die monotonen Aufgaben) im Gegenteil sein eigentümliches Merkmal ist die Reihenfolge der Aufgaben; drittens ist es regelmäßig, unterliegt dem Training, der Befestigung. Die bewusste Fertigkeit fordert vom Schüler die Konzentration der Aufmerksamkeit, die Anstrengung und die Ausdauer. Wenn es dem Lehrer gelingt, bei den Schülern solche Fertigkeit zu produzieren, bekommt er von ihnen die Rückmeldung in Form von den Antworten: ob alles klar war oder nicht. Im Falle irgendwelcher Schwierigkeiten, der Lehrer hilft den Schülern mit den zusätzlichen Erklärungen.

Bewertungen des Unterrichtsprozesses sind die besonderen Formen der Rückmeldung, die sich von der Einschätzung des Unterrichtsergebnisses unterscheiden. Wenn die Einschätzung des Unterrichtsprozesses strebt, Informationen zu sammeln, um die konkrete Situation zu beeinflussen, ist die Einschätzung des Unterrichtsergebnisses auf das System der Bildung, auf die Eintragung der langfristigen Veränderungen in ihr gezielt. Auf dem Beispiel der Ausführung der Schularbeit kann man diesen Unterschied vorführen: die Schularbeit gibt die Informationen über das Niveau der Ausbildung der Schüler. Ausgehend von dem man die Schlussfolgerung ziehen kann, wem die Schüler gelernt haben, und wem gibt es, worauf folgt,

um das Wissen zu vertiefen zu akzentuieren, welche Art des Unterrichts wirksam war. Die Informationen spielen die entscheidende Bedeutung für den Lehrer. Wenn der Lehrer weiß, dass es den Schülern besonders gelingt, kann er den Lauf des Unterrichts im Folgenden korrigieren, seine mehr interessant und nützlich gemacht. Die Einschätzung des Unterrichtsprozesses lässt zu, den Prozess der Ausbildung sichtbar zu machen [2, 47].

Medien leisten eine positive Einwirkung auf den Unterricht. Der Computer, das Internet, die Whiteboards, Tablets machen den Unterricht moderner und belebter. Oft verwendet der Lehrer die neuen Medienmittel wie der Ersatz der Traditionellen. Wichtiger ist die vernünftige Nutzung dieser Mittel. Der moderne Lehrer braucht professionelle Kompetenz.

Der Erfolg dieser oder jener Methode hängt vor allem von der Kompetenz des Lehrers, seiner Fähigkeit deutlich und genau ab, die pädagogischen Ziele zu bestimmen. Wenn es dem Lehrer gelingt, zu verwirklichen, wird eine beliebige Methode wirksam. Die Rückmeldung tritt als der Schlüsselfaktor für den sichtbaren und erfolgreichen Unterricht auf. Wenn es plötzlich vorkommt, dass eine Methode nicht arbeitet, muss man anderen wählen. Im Arsenal des Lehrers soll das breite Spektrum von Methoden sein. Außerdem soll der Lehrer den positiven Einfluss dieser oder jener Methoden sorgfältig studieren, die bekommenen Ergebnisse bei der wirksamen Wechselwirkung auf den Unterricht verwenden [3, 15].

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PROBLÈMES ENVIRONNEMENTAUX ET ÉTHIQUES
DE LA ZOOTHÉRAPIE

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Abstract: Le but de la recherche est l'étude de la zoothérapie et la sensibilisation aux défis environnementaux et éthiques de cette technique médicale. La méthode de projets a permis d'aborder le stress d'un point de vue socio-psychologique et d'utiliser l'expérience personnelle des étudiants et des professeurs pour appréhender ce phénomène sous la forme d'une vidéo.

Key words: écologie humaine, zoothérapie, méthode de projets, vidéo thématique.

Introduction. La présente étude se concentre sur des sources d'enrichissement de la vie sentimentale de l'homme dans le milieu urbain par les animaux qui font élever son niveau de bonheur: animaux de compagnie, fermes urbaines [3], coins des animaux, zoos, parcs, production artistique.

Le culte égyptien du chat se voit aux tombeaux des pharaons à Thèbes, où une stèle montre un personnage historique de la 11e dynastie (de 2160 à 1994 av. J.-C.), le roi de Hana avec, entre ses pieds, Bouhaki son chat [2]. C'est le premier nom de l'animal de compagnie que nous connaissons. En 802, Charlemagne a reçu du calife de Bagdad Harun-Al-Rachid un éléphant qui portait le nom d'Abul-Abbas qu'il ne quittait jamais. Au XVIIe siècle le cardinal de Richelieu qui avait un caractère mélancolique s'entourait de tout petits chats dans son cabinet, après sa mort il y en avait quatorze, l'histoire a conservé leurs noms [2, p. 258]. Au XVIIIe siècle, Louis XV permettait à Brillant, le chat angora blanc, de siéger aux réunions du Conseil. Au musée de Florence Nightingale à Londres on expose la carapace de la tortue de compagnie, le petit Jimmy, qui avait mis de la gaîté à l'hôpital militaire Scutari entre 1853 et 1856 pendant les guerres de la Crimée.



Figure 1. La tortue du Florence Nightingale Museum, Londres.

Nous avons effectué un sondage auprès des étudiants et des professeurs de la Faculté écologique et de l'Institut Agro-technologique de RUDN (45 répondants). Ils ont répondu que leurs amis et eux ont ou ont tenu auparavant ou rêveraient d'avoir les animaux de compagnie suivants:

- hamsters, chiens, chats, lapins, rats, cobayes, hérissons et même un fenech;
- perroquets, poulets, canaris;
- tortues, poissons, escargots géants (Achatines), cafards australiens, et même un serpent.

Quant aux animaux pour des cures des zoothérapie (que tout le monde crois efficace contre les stress et d'autres maladies) on a nommé:

- cheval, chien, chat, dauphins, lamantins, vache, veau, mouton, éléphant, tigre (lait maternel), orangs-outans, girafes.
- raies, requins, tortues géantes, poissons des mers tropicales, animaux de corail, crustacés, étoiles, poulpes.

Tous les participants ont une certaine expérience personnelle des situations où la communication avec un animal a eu un effet positif sur leur comportement social, émotionnel ou cognitif.

A l'un des cours de la langue française pour les futurs médecins le sujet de la zoothérapie a été lié aux problèmes du stress après une

journée d'études. Quant aux futurs agriculteurs et écologistes, ce sujet est entré dans le premier thème de la première année «Ma famille». À la suite de la discussion il a été décidé de développer le projet "Zoothérapie", un groupe interfacultaire de recherche a été formé, qui a compris les étudiants et les membres de leurs familles. Une vidéo a été filmée sur la communication avec les différents animaux de compagnie et les dauphins. Voici le texte qui à plusieurs reprises a été prononcé par les étudiants en nageant avec les dauphins à l'Océanarium de Moscou et à l'étranger pendant les vacances:

"Me voilà enfin avec les dauphins!! Houppie! Je suis étudiante de RUDN. C'est ma deuxième année et ce semestre, je le sent stressant ! Alors, pour lutter contre la déprime j'ai choisi la meilleure des thérapies – je suis venue ici, à Mosquarium, l'aquarium de Moscou pour me mettre en contact physique, physiologique et émotionnel avec des dauphins.

La delphinothérapie est une zoothérapie comme toutes les autres – bien sûr, le contact avec les chats ou les chiens est très bien, mais moi, j'ai toujours rêvé des dauphins qui nous parlent!

Et voilà la fin de cette séance merveilleuse. Je me sens soulagée, grâce à l'émission d'ultra-sons, peut-être ?! Florence Nightingale, durant la guerre de Crimée il y a cent cinquante ans gardait une tortue à l'hôpital – a-t-elle jamais pensé à un tel développement de son expérience !"

Voici le sixième projet [6] mis en œuvre par les étudiants, et il était émotionnellement le plus frappant. Chaque membre de l'équipe avait quelque chose à dire de son expérience personnelle. Il est important que les études critiques de cette méthode de traitement [5] les ont laissés tout indifférents. La conclusion était intuitive: si même les scientifiques étaient incapables de prouver l'efficacité de la zoothérapie, au niveau pratique, la méthode est depuis longtemps et très largement utilisée avec succès [1; 4]. Les autres animaux de compagnie ont fait l'objet des autres parties du projet, on discutait en particulier, la question des droits des animaux à la liberté et la question du bien-être animal.

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**ПРОБЛЕМА ПСИХОЛОГИЧЕСКОЙ ГОТОВНОСТИ
БУДУЩИХ ОФИЦЕРОВ МВД К ПРОФЕССИОНАЛЬНОЙ
ДЕЯТЕЛЬНОСТИ**

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***Аннотация.** Показана актуальность проблемы психологической готовности будущих офицеров МВД к профессиональной деятельности. Рассматриваются её специфика в контексте структуры профессиональной деятельности, дается определение и показана её структура, выделены уровни, перечислены условия, влияющие на успешность её формирования.*

***Ключевые слова:** психологическая готовность, будущие офицеры МВД, компоненты психологической готовности.*

Система образования в Республике Казахстан развивается с учётом новых ценностей, иных ориентиров общества, направленных на субъект-субъектную позицию, диалоги, а также на конкурентоспособность, мобильность, высокую компетентность его субъектов. В связи с этим предъявляются более высокие требования к профессиональной подготовке специалистов в условиях вуза, к организации педагогического процесса, к внедрению и реализации передовых инновационных технологий и к выявлению эффективных путей формирования личности самого специалиста. Эти особенности предъявляют новые, повышенные требования к личности офицера внутренних войск (МВД). Возрастает роль таких качеств как высокий уровень общего образования и культуры, устойчивость к воздействию неблагоприятных факторов, психологическая, педагогическая, экономическая, правовая подготовленность, профессиональная мобильность, готовность к непрерывному самообразованию.

Профессиональная деятельность офицера при всей своей специфичности является одним из видов профессиональной деятельности и находится с последней в родовидовом отношении. Следовательно, изучение данного вопроса следует начинать с обращения к проблеме готовности к профессиональной деятельности в психолого-педагогической литературе.

Теоретический анализ источников (Н.Д. Левитов, Е.П. Ильин, В.Н. Пушкин, Л.С. Нерсесян, Г.М. Гагаева, А.А. Ухтомский, М.И. Виноградова, Б.Ф. Ломов, П.А. Рудик, М.А. Котик, А.Р. Лурия и др.) показал, что готовность – это состояние, характеризующееся динамической концентрацией внутренних сил человека, позволяющее ему целесообразно регулировать свою деятельность.

Большинство исследователей, занимающихся этой проблемой, относят понятие готовности к числу личностных характеристик, определяя её: как устойчивую характеристику личности; как определенный уровень развития личности, предполагающий сформированность целостной структурированной системы ценностно-ориентированных, когнитивных, эмоционально-волевых и операционно-поведенческих качеств личности; как определенное психическое состояние личности. Это позволяет утверждать, что основой

готовности к деятельности является именно психологическая готовность.

Особое внимание проблеме психологической готовности уделяется в трудах военных педагогов и психологов (М.И. Дьяченко, А.Д. Глоточкин, В.Ф. Давыдов, В.И. Варваров, А. Кандыбович, М.П. Коробейников, Э.П. Утлик, Н.Ф. Феденко, Л.Н. Кузнецов, В.Л. Марищук, Н.А. Пономаренко, А.М. Столярченко, С.М. Съедин, В.В. Сысоев, Ю.Н. Минаев, М.П. Новожилов) в связи с особой значимостью и специфичностью профессиональной деятельности, осуществляемой военнослужащими. Проведённый анализ научных работ указывает на необходимость формирования психологической готовности, сущностью которого является целенаправленное воздействие на военнослужащих с целью формирования у них готовности, устойчивости, активности, других характеристик и качеств, обеспечивающих высокую надёжность действий в условиях, требующих высоких физических и нервно-психических затрат[4].

В зависимости от специфики структуры профессиональной деятельности готовность рассматривается в разных аспектах. В частности, по отношению к определенному виду деятельности она понимается как «мотивированный данным видом деятельности комплекс качеств, знаний, практических умений и навыков, состояний и отношений, необходимых для достижения социально-значимых целей, результатов» (цит. по: [5, с.24]).

Анализ состояния проблемы готовности личности к профессиональной деятельности показал, что это особое состояние и относительно устойчивая характеристика личности. Несмотря на разнообразие подходов к изучению её форм, все специалисты сходятся в том, что это предрасположенность субъекта ориентировать свою профессиональную деятельность определенным образом.

В данной работе под психологической готовностью мы понимаем «субъективное состояние личности, считающей себя способной и подготовленной к выполнению определенной профессиональной деятельности в условиях специфической профессиональной ситуации и стремящейся её выполнять» [1, с. 99].

Специфика психологической готовности офицера к профессиональной деятельности в современных условиях состоит в том, что он должен быть готов не только к выполнению непосредственно должностных и служебных обязанностей, но, прежде всего, к осуществлению управленческих, организаторских, педагогических функций в боевой, учебно-боевой, служебной и повседневной деятельности.

Исходя из данной специфики, базовыми компонентами психологической готовности будущего офицера к предстоящей профессиональной деятельности ученые выделяют в её содержании следующие взаимосвязанные компоненты: мотивационный, эмоциональный, волевой, познавательный, операциональный, организаторский и коммуникативный (Е.М. Левин, В.А. Беловолов, 2011). Сформированность перечисленных компонентов детерминирована уровнем развития у будущего офицера соответствующих им личностных качеств. Рассмотрим подробнее содержание некоторых указанных компонентов. *Мотивационный компонент* проявляется в потребности успешно выполнять профессиональные задачи, в интересе к деятельности, в вариантах её осуществления; *ориентационный компонент* включает представления о специфике деятельности и условиях её осуществления; *операциональный* предполагает овладение приемами и способами деятельности, необходимыми умениями и навыками; *эмоционально-волевой* отображает чувство ответственности за результаты деятельности, самоконтроль, внутреннюю потребность индивида в управлении действиями; *познавательный компонент предполагает* знания и представления о содержании профессии офицера внутренних войск МВД Казахстана, требованиях к данной профессии, средствах решения профессиональных задач. Таким образом, явлением, отражающим сущность познавательного компонента готовности будущих офицеров к профессиональной деятельности, будет являться сформированный у курсанта образ профессиональной деятельности офицера.

Другие исследователи, рассматривая структуру психологической готовности, выделяют еще оценочный компонент, рефлексивный, ориентационно-мобилизационный и

др. компоненты в зависимости от специфики профессиональной деятельности (Е.К. Лунегова, 2006; В.Ф. Жукова, 2012 и др.).

При проведении сравнительного анализа понимания важности разных компонентов психологической готовности, можно увидеть, что основным является мотивационный компонент, включающий совокупность профессионально обусловленных потребностей, мотивов, систему отношений будущего офицера к профессиональной деятельности, осознание и принятие профессиональных ценностей. Следующим по частоте обращения к нему выступает эмоционально-волевой компонент, который отражает чувство ответственности за результаты деятельности, самоконтроль, ценностные ориентации, моральные принципы, умения управлять действиями.

Поскольку готовность будущего офицера к профессиональной деятельности понимается как сложное личностное образование, обладающее свойствами системы, следует отметить, что все вышеназванные компоненты готовности тесно взаимосвязаны и взаимообусловлены. Исходя из этого, её формирование нецелесообразно и, по всей видимости, невозможно осуществлять раздельно, «по частям». Это необходимо учитывать при определении совокупности педагогических условий, форм и методов, направленных на формирование готовности будущего офицера к профессиональной деятельности.

Условиями эффективности формирования у будущих офицеров психологической готовности к профессиональной деятельности в вузе, по мнению Е.М. Левина, выступают:

- доминирование в мотивации учебной деятельности курсантов профессиональных побуждений приобретения твердых знаний, навыков и умений в сфере предстоящей профессиональной деятельности;
- высокий уровень профессионально-педагогической подготовленности субъектов (преподавателей, командиров курсантских подразделений) педагогической программы формирования у будущих офицеров психологической готовности к профессиональной деятельности;
- организация учебно-воспитательных воздействий на курсантов на основе постоянного учета опыта реальной

профессиональной деятельности, решения различных задач подразделениями и частями постоянной готовности;

- придание процессу формирования у курсантов психологической готовности управляемого характера с систематическим анализом достигнутых результатов [4].

Существенный интерес для нашего исследования представляют труды, в которых определяется уровень психологической готовности личности к действиям. Здесь можно отметить по крайней мере четыре уровня: низкий, уровень потенциальной психической готовности, функционально-целевой и интеллектуально-регулятивный. Эти уровни формируются у человека с помощью многоуровневой психологической подготовки [3].

Результаты констатирующего эксперимента позволяют сделать вывод о том, что психологическая готовность к предстоящей службе у будущих офицеров МВД сформирована недостаточно, а значит, в дальнейшей профессиональной деятельности, они не смогут выполнять на высоком уровне свои должностные и служебные обязанности, что будет выражаться в несоответствии поведенческих актов реальным условиям, несогласованности действий, повышенном уровне конфликтности, негативном отношении к поставленным целям, дезорганизации собственной деятельности и деятельности подчиненных.

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**АНАЛИЗ НЕГАТИВНОГО ВОЗДЕЙСТВИЯ ВЫХЛОПНЫХ
ГАЗОВ НА ОРГАНИЗМ ЧЕЛОВЕКА НА ПРИМЕРЕ Г.
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В настоящее время проблема экологической безопасности республики приобрела особую остроту, особенно это касается и города Грозный [2].

Грозный - столица Чеченской республики, один из самых часто упоминаемых городов Российской Федерации, занимает II место по площади и III - по населению -287, 410чел. (на 2016 год), что составляет 20,62 % населения республики. Численность населения по районам города распределена следующим образом:

1. Заводской район — 68,981человек.
2. Ленинский район — 85,901человек.
3. Октябрьский район — 70,025человек.
4. Старопромысловский район — 62,503человека.

Основная экологическая проблема города – высокий уровень загрязненности атмосферного воздуха, наряду с предприятиями жилищно-коммунального хозяйства и нефтяного комплекса Автотранспорт также является одним из основных источником загрязнения.

Постоянный контроль состояния атмосферного воздуха во всех районах ЧР и города Грозного является важнейшей задачей.

Автомобильный транспорт на Земле является одним из главных загрязнителей атмосферы. На него приходится порядка 40 процентов всех загрязнений воздуха. Среднестатистический

автомобиль выбрасывает в год: 135 килограмм окиси углерода; 25 килограмм окислов азота; 20 килограмм углеводородов; от 7 до 10 килограмм бензпирена; 4 килограмма двуокиси серы; 1,2 килограмма твердых частиц [1].

На территории нашей республики зарегистрировано 317459 автомобилей от 01.11.2016 г. В городе Грозный зарегистрировано 70246 автомобилей: Заводской район - 12258; Октябрьский район - 18365; Ленинский район - 26014; Старопромысловский - 13609.

Если умножить количество этих веществ на количество автомобилей зарегистрированных в городе Грозном, то получится: 9483210 кг. окиси углерода; 1756150 кг. окислов азота; 1404920 кг. углеводородов; 702460 кг. бензпирена; 280984 двуокиси серы; 84295.2 кг. твердых частиц.

На данный момент в мире насчитывается порядка 500 миллионов автомобилей. Все вместе они выбрасывают в год: 67,5 мегатонн окиси углерода и 12,5 мегатонн окислов азота. Автомобильные производители ставят главной целью при создании новой модели автомобиля экономию в расходе топлива. Ведь меньший расход топлива экономит не только семейный бюджет, но и является причиной уменьшения выбросов выхлопных газов в атмосферу.

Выхлопные газы в своем составе содержат около 300 веществ, большинство из которых токсичны.

На здоровье человека и окружающую среду отрицательное воздействие оказывают 4 составляющие выхлопных газов: угарный газ; углеводороды (недожжённое топливо); оксиды азота; твердые частицы.

Угарный газ – газ, который не имеет запаха, несколько легче воздуха, практически не растворимый в воде. Является продуктом неполного сгорания топлива. Образуется в результате неудовлетворительного распыливания топлива, в ходе холоднотемпературной реакции при недостатке кислорода. В дальнейшем, при достаточном количестве кислорода возможно образование диоксида. Определение концентрации угарного газа целесообразно при оценке работы бензиновых двигателей.

Оксиды азота – это наиболее токсичные компоненты отработавших газов. При оптимальных условиях азот – достаточно

инертный газ. На фоне высокого давления и особенно высоких температур этот газ вступает в реакцию с кислородом. Оксиды азота раздражают слизистые оболочки глаз, носа, легких. Это связано с тем, что при взаимодействии с влагой образуются азотная и азотистая кислоты.

Диоксид представляет собой бледно-желтую жидкость, которая входит в состав смога. Для организма человека диоксиды наиболее опасны.

Оксиды азота опасны при попадании на листовую поверхность.

Углеводороды – это органические соединения, в молекулу которых входят лишь атомы углерода и водорода, это токсичные вещества. В состав выхлопных газов входит около 200 различных углеводородов. Углеводородам принадлежит большая роль в формировании биологически активных веществ, которые вызывают раздражение глаз, верхних дыхательных путей, провоцируя возникновение различных патологий, наносят ущерб флоре и фауне. Углеводородные соединения обладают наркотическим эффектом, оказывая воздействие на центральную нервную систему.

Конституция Российской Федерации (1993), статья 42 гласит: «Каждый имеет право на благоприятную окружающую среду, достоверную информацию о ее состоянии и на возмещение ущерба, причиненного его здоровью или имуществу экологическим правонарушением» [3].

Экологический кризис возникает в результате несоответствия потребностей человека и возможностей природы.

Далеко не каждый водитель транспортного средства задумывается о том, какой вред он наносит атмосфере в целом и каждому человеку в частности. И именно поэтому в нашей республике с каждым годом значительно увеличивается число онкологических, заболеваний, заболеваний сердечно-сосудистой и нервной системы. В интересах каждого жителя республики обезопасить себя и своих близких от негативного воздействия автотранспорта и следовательно, от факторов, которые способствуют развитию этих заболеваний.

Наибольшее влияние выхлопные газы оказывают на водителей и пассажиров автотранспорта, особенно тех, кто долго стоит в пробках.

Среди пешеходов, в наибольшей степени страдают дети – максимальная концентрация в приземном воздушном слое. Выхлопные газы способствуют снижению интеллекта и ухудшению памяти у детей.

Так как улучшить экологическую обстановку в республике невозможно не имея профессиональных экологических знаний и умений, студентам педагогического университета, особенно будущим учителям естественно-научного профиля необходимо формирование экологической культуры в условиях образовательного процесса- в процессе теоретического обучения, включения студентов в учебную и научно-исследовательскую деятельность, прохождения полевой практики.

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**РАЗВИТИЕ ИДЕИ ИЗУЧЕНИЯ ЭКОЛОГИИ ГОРОДА В
ПЕДАГОГИЧЕСКИХ ИССЛЕДОВАНИЯХ**

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Экология наука междисциплинарная, а значит, большой интерес представляет междисциплинарный подход к исследованию городской среды, разработанный в географии. Под термином «подход» понимается стратегия исследования, которая базируется на специфических системах понятий и принципов.

Термин «экологический подход» предложен и разработан А.А.Минцем и В.С.Преображенским и представляет собой частный случай применения системной ориентации. Понятие широко используется в экологических исследованиях, с учетом представлений о ценностных отношениях среды и хозяина [1].

В своем исследовании я понимаю экологический подход как общенаучный, междисциплинарный и исходя из этого рассматриваю экосистему города как сложный организм в системе связей. Вместе с этим в работе мы употребляем элементы географического подхода, в корне которого лежат территориальность и комплексность.

Экологию города начали исследовать с общих позиций проблемного подхода. Обобщенные позиции методики преподавания учебного предмета разрабатываются различными методическими подходами. Выделяют три подхода к изучению экологии города: объектно-ориентированный, субъектно-ориентированный и проблемно-ориентированный. Разработана стратегия изучения городских поселений, и назвал как интегрированный подход. Выделяют 6 подходов исходя из вида первоначальной информации и по порядку удержания целостности городской среды [2].

Рассмотрим коротко эти подходы:

Перечисление. Измеряя и перечисляя показатели, можно получить полное представление о городской среде. Нельзя

перечислить все многообразие городской среды, из-за затрудненного пространственно-временного районирования городской среды.

Комплексный показатель. На основе целостности городской среды свести показатели разного рода в один комплексный с помощью статистических операций. Отсутствие обоснованных процедур, объяснения факторов.

Модельный. Разработка модели городской среды, определяющей ее поведение. Затруднения в создании универсальной модели.

Индикаторный. Обнаружить такого индикатора, на основании которого получают комплексную характеристику городской среды. В качестве недостатка можно указать то, в процессе практики все сводится к применению одного показателя, как тепловое излучение.

Субъектный. Идея - только человек может целостно воспринимать городскую среду. Основу зонирования составляет экспертно-социологическая информационная составляющая. В качестве недостатков можно привести индивидуальное восприятие, понимание и оценку городской среды.

Проблемный. Комплексы проблемных ситуаций, вызванные загрязнением городской среды, их обнаружение, исследование, устранение. Недостаток подхода скрывается в его слабой подготовке. Ресурсно-загрязнительный подход преобладает в большинстве региональных программ, которые направлены на решение экологических аспектов существования современных городов. В этом подходе основное внимание акцентируется на проблеме загрязнения окружающей среды и ресурсов. Программа деятельности человека ориентирована не на человека, а на окружающую ее среду. Главным средообразующим компонентом является человек. Наиболее близок к нему средовой подход, применяющийся в экологии. Окружающая среда современного города трактуется в двух направлениях в качестве:

- многокомпонентной экологической иерархии;
- эволюционной последовательности, которая дает возможность контроля и прогноза развития.

Основой городской жизни составляет среда искусственно созданное человеком антропоцентризм он должен сочетаться с

экоцентризм, который ориентируется на охрану природы, как естественной составляющей природной городской среды, так и самого города. И поэтому оба методологических подхода должны быть в основе научной теории, ориентированных на изучение экологии города и среды городской [2].

Исходя из вышеизложенного в целях преподавания экологии города в школе предлагается новый интегральный подход - антропоэкоцентрический. При таком подходе центральное место среды города занимает человек, в качестве биосоциального вида, формирующий среду города для себя, на основании экологических связей и потребностей экологических взаимосвязей и потребностей экологических живых организмов.

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Лихачёва Е.А.

ОСОБЕННОСТИ ЦЕННОСТНЫХ ОРИЕНТАЦИЙ ОБУЧАЮЩИХСЯ В СИСТЕМЕ ВЫСШЕГО ОБРАЗОВАНИЯ

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Аннотация: Статья посвящена изучению теоретических аспектов ценностных ориентаций в условиях обучения в ВУЗе. В статье приведены данные эмпирического исследования обучающихся в высшем учебном заведении.

Ключевые слова: ценностные ориентации, терминальные ценности, инструментальные ценности.

В различных науках, таких как философия, психология и педагогика используется понятие «ценностные ориентации».

Тематике ценностных ориентации посвящено достаточное количество работ. Если мы обратимся к вопросам педагогики и психологии, то увидим, что ценностные ориентации были предметом рассмотрения в работах Б.Г. Ананьева, В.С. Мухиной, Е.В. Шороховой, В.А. Ядова, И.В. Клименко, Л.В. Шутова и др.

В работах этих авторов отмечается, сложность ценностных ориентаций как социально-психологического феномена, который отражает различные характеристики личности: ее направленность и активность, влияет на систему взаимоотношений как с окружающими людьми, так и с самим собой. Ценностные ориентации придают смысл поведению человека и его поступкам. Система ценностных ориентации имеет многоуровневую структуру на вершине которой находятся ценности, связанные с идеалами и жизненными целями личности[1].

А. Маслоу [2] в качестве ценностей рассматривает сами потребности, особое внимание уделяя тем что носят духовный характер: потребность в безопасности, в социальной общности, уважении, дружбе и одобрении.

М. Рокич характеризует человеческие ценности по основным признакам:

- 1) из общего числа ценностей, количество тех, что являются достоянием человека совсем небольшое количество.
- 2) все, без исключения, люди обладают одинаковыми ценностями, но в разной степени;
- 3) ценности образуют собой системы;
- 4) в обществе и культуре можно проследить истоки всех ценностей
- 5) влияние ценностей прослеживается практически во всех социальных сферах

В своих работах М. Рокич выделил два класса ценностей: терминальные и инструментальные.

Терминальные ценности автор понимает, как воззрение в том, что у человека есть какая-либо личная цель и эта цель, если рассматривать с общественной точки зрения, достойна того чтобы к ней стремиться. Под инструментальными ценностями он понимал убеждения личности, которая рассматривает свои ценности с предпочтительной точки зрения.

Для определения ценностных ориентаций существует методика М. Рокича «Ценностные ориентации» [3]. С помощью данной методики можно было узнать, какие ценности в приоритете, и, наоборот, какие ценности менее значимы для данной личности.

Респондентам предъявляется два списка ценностей (по 18 в каждом) на листах бумаги в алфавитном порядке. В списках испытуемые присваивают каждой ценности ранговый номер. Вначале предъявляется набор терминальных, а затем набор инструментальных ценностей.

С целью изучения ценностных ориентаций, обучающихся в высшем учебном заведении, проводился эксперимент.

В эксперименте приняли участие две группы: экспериментальная группа (ЭГ), объединяющая испытуемых первого курса (ЭГ1) и второго курса (ЭГ2) обучающихся по направлению подготовки «Биология, безопасность жизнедеятельности» естественно-технологического факультета Южно-Уральского государственного гуманитарно-педагогического университета (50 человек), с которой осуществлялась работа, запланированная на формирующий эксперимент в рамках образовательного процесса. И контрольную группу (КГ1) – обучающиеся первого курса естественно-технологического факультета Южно-Уральского государственного гуманитарно-педагогического университета по направлению подготовки «Химия, биология» и (КГ2) обучающиеся второго курса физико-математического факультета (50 человек).

Проанализировав полученные данные, можно сделать вывод, что из терминальных ценностей у студентов наиболее предпочтительными являются следующие: «Материально обеспеченная жизнь», «Продуктивная жизнь», «Интересная работа», «Здоровье». Низко ценятся терминальные ценности: «Красота природы и искусство», «Творчество» и «Познание». У испытуемых ЭГ1 лидирует ценность материально обеспеченная жизнь, у ЭГ2 «Продуктивная жизнь».

Высокое ранговое место респонденты определяют материально-обеспеченной жизни. Примерно 50% респондентов поставили ценность «Материально-обеспеченная жизнь» на первое место, в ответах других студентов этот пункт не занимал ниже 4-го

места. На последнем месте в иерархии всех ценностей для будущих педагогов оказались «Развлечения» и «Свобода»

Обобщая полученные данные, мы склонны полагать, что у респондентов данной выборки, интерес направлен на материальные ценности, в то время как духовные ценности не являются особо значимыми в жизни.

При анализе инструментальных ценностей было выявлено, что самыми важными ценностями являются «Смелость в отстаивании своего мнения», «Ответственность», «Исполнительность». Низко ценятся такие инструментальные ценности, как «Чуткость», «Честность», «Эффективность в делах».

Безусловно, положительным является тот факт, что среди первых мест выделены «Ответственность» и «Исполнительность», что очень важно для будущего педагога.

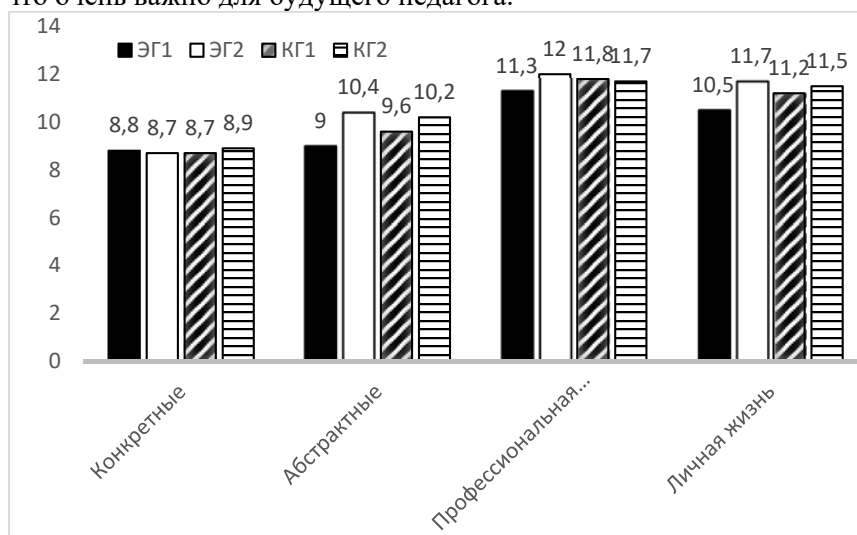


Рис. 1. Средние значения терминальных ценностей, объединенных в содержательные блоки (М. Рокич «Ценностные ориентации»)

Итак, мы видим, что для обучающихся характерно стремление к достижению конкретных и осязаемых результатов, стремление к независимости и высокому материальному благосостоянию. Данные респонденты не нуждаются в социальном

одобрении своего поведения, довольны размерным ходом жизни, стремятся к расширению своего кругозора.

Корреляционный анализ, проведённый между ценностными ориентациями, зафиксировал статистически значимую связь. Критерием оценки наличия связи между интересующими нас переменными послужил коэффициент Спирмена.

В группах выявлены положительные корреляции между продуктивной жизнью ($r_s=0.94$; $p\leq 0,05$), смелостью в отстаивании своего мнения значение ($r_s=0.99$; $p\leq 0,05$) Также отмечаются отрицательные корреляции между такими терминальными ценностями как развлечения ($r_s=0.99$; $p\leq 0,05$), чуткость ($r_s=0.95$; $p\leq 0,05$).

Так как ценности входят в структуру личности и определяют ее направленность, то можно сказать, что респонденты, принявшие участие в исследовании, в меньшей степени готовы к профессиональной самореализации, их больше волнуют ценности, связанные с личной жизнью, такие как любовь, счастливая семейная жизнь, наличие хороших и верных друзей. Для ориентированных на личную жизнь учащихся близкими являются конкретные ценности (коэффициент корреляции $r=0,268$, $p\leq 0,05$), такие как общественное признание, наличие хороших и верных друзей, здоровье, материально обеспеченная жизнь и другие. Ориентируясь на личную жизнь, обучающиеся отодвигают на второй план ценности профессиональной самореализации (коэффициент корреляции $r= - 0,586$ $p\leq 0,05$) и абстрактные ценности ($r= - 0,247$ $p\leq 0,05$).

Корреляционный анализ показал, что чем больше студенты предпочитают ориентироваться на конкретные ценности, тем менее значимыми для них являются абстрактные ценности (коэффициент корреляции $r= - 0,982$ $p\leq 0,05$).

Для обучающихся гораздо более привлекательными являются здоровье, наличие хороших и верных друзей, чем познание, красота природы и искусства, жизненная мудрость, так как эти категории невозможно измерить, и нет критериев, которые бы показали насколько эти позиции важны для каждого конкретного человека. Исключение составляет такая абстрактная ценность как любовь, которая занимает одну из лидирующих позиций среди терминальных ценностей. Ориентированные на личную жизнь они

реже выбирают ценности профессиональной самореализации (коэффициент корреляции $r = -0,586$ $p \leq 0,05$).

Анализ данных, свидетельствует что любовь, свобода, счастливая семейная жизнь, друзья, удовольствия не сочетаются в сознании молодых людей с деятельной, продуктивной жизнью, интересной работой, развитием и признанием. Это свидетельствует о незрелости, о неумении учащихся увидеть взаимопроникновение и взаимодополнение этих жизненных ценностей. Среди инструментальных ценностей, объединенных в содержательные блоки, на первом месте стоят конформистские ценности, ценности дела и принятие других. Меньшие рейтинговые показатели соответствуют более предпочитаемым ценностям.

Большинство респондентов ориентированы на материальные ценности, труд для них выступает не потребностью, а только средством, позволяющим заработать деньги.

Среди инструментальных ценностей, объединенных в содержательные блоки, на первом месте стоят конформистские ценности, ценности дела и принятие других (рис. 2). Меньшие рейтинговые показатели соответствуют более предпочитаемым ценностям

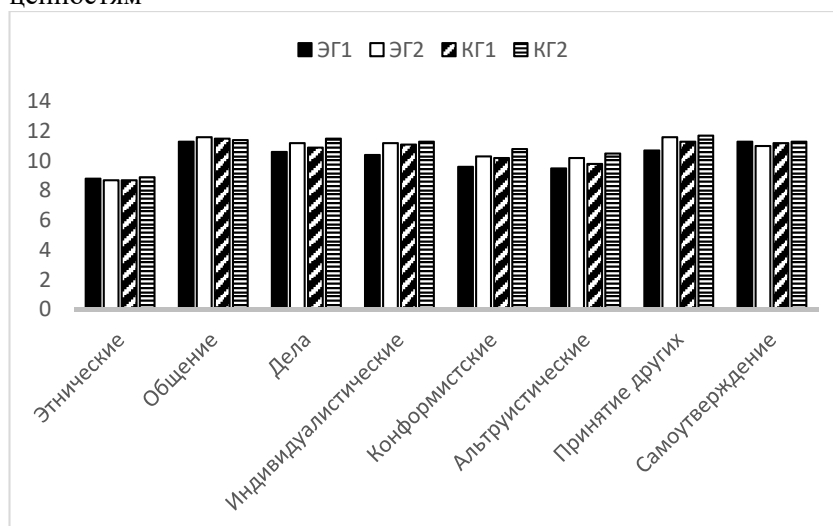


Рис 2. Показатели инструментальных ценностей по методике М. Рокича «Ценностные ориентации»)

Из рисунка 2 видно, что преобладающей ценностью у всех испытуемых является общение и принятие других. Наименьшие ценности – этнические

Таким образом, можно сделать вывод, что ценностные ориентации играют важную роль в формировании личности обучающегося в университете. Ценностные ориентации представляют собой целую систему, которая оказывает влияние на личность и определяет ее направленность как в личной, так и в профессиональной сфере.

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Оказова З.П., Цагараева Е.Ф., Гатаева М., Ревазова С.М.
**ОСНОВНЫЕ АСПЕКТЫ СОВРЕМЕННОГО ОБРАЗОВАНИЯ
В РАМКАХ ГОТОВНОСТИ ШКОЛЬНИКОВ К
ИССЛЕДОВАТЕЛЬСКОЙ ДЕЯТЕЛЬНОСТИ В ОБЛАСТИ
ЭКОЛОГИИ**

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Анализ литературы показал, что для проведения исследовательской деятельности по экологии необходима интеграция основного и дополнительного образования. Трудности в становлении экологии, как одного из предметов в школьной программе - это скорее последствия не только кризиса нынешнего образования, связанного с изменением общества, но и отражением отношения общества непосредственно к экологии в целом.

Среда образования, в которой решаются самые главные проблемы экологического образования, не имеет границ не только в пространстве, но и во времени. Иными словами, от состояния экологического образования зависит непосредственно и формирование готовности старшеклассников к деятельности в области экологии, направленной на исследование. Мы рассматриваем возможность реализации общеобразовательной функции образования путём вовлечения учащихся в данную деятельность в сфере экологии, с целью подготовки старшеклассников к её осуществлению.

Сущностью отношений, стоящих в начале любой образовательной структуре, является взаимная передача информации между участниками процесса образования.

Для поиска данных о наличии специальной образовательной структуры, которая служит формированию готовности учащихся старших классов к исследовательской деятельности в сфере экологии, и её отображения мы использовали различные источники информации.

В школьном образовании структура, служащая для формирования готовности старшеклассников к исследовательской деятельности в области экологии, представлена частично.

Естественно смысл этой деятельности старшеклассников в области экологии, направлен не только на подготовку кадров в сфере науки, но и на прививание естественнонаучного мышления, и на формирование экологической культуры подрастающего поколения. Это явление можно пояснить отсутствием стабильной и неразрывной связи высшей школы со старшим звеном средней школы - структурой, которая поддерживает исследовательскую деятельность старшеклассников в области экологии в системе образования.

Необходимо обратить внимание на обработку имеющейся информации, которая послужит основой для становления и совершенствования образовательных структур, направленных на формирование готовности обучающихся старших классов к исследовательской деятельности в области экологии.

На государственном уровне исследовательская работа в общеобразовательной школе признана одной из наиболее многообещающих форм проявления творческой активности обучающихся, соответствующие современным требованиям общества, и мировым стремлениям преобразования сферы образования в целом.

Особое место в создании научно-методического обеспечения исследовательской деятельности школьников в области экологии берут на себя периодические издания педагогической и экологической направленности, которые в своем содержании отражают дидактические и методические материалы об организации исследовательской работы учащихся [2].

Из всех существующих на данный момент видов учебной литературы, для подавляющего большинства школьников главным носителем содержания образования стал учебник. Лишь содержание учебников в нужной мере показывает практическую важность и действенность теоретических построений педагогической науки. Можно считать, что только учебник может в полной мере функционировать в качестве главного орудия предметной поддержки формирования всех компонентов

готовности старшеклассников к работе в области экологии, направленной на исследование.

Анализируя становление готовности старшеклассников к исследовательской деятельности по экологии и принимая во внимание результаты исследования системы образования, мы выработали положения, отображающие подход к развитию образовательной структуры, предоставляющий реализацию этой цели. Сущность данного подхода состоит в том, что образование и совершенствование образовательной структуры, гарантирующий развитие готовности старшеклассников к исследовательской деятельности в области экологии, проводится на основе внедрения в современное традиционное обучение способов и средств, которые направлены на становление и развитие данного качества у этих учащихся [1].

Проведенный анализ состояния экологического образования старшеклассников говорит об отсутствии структуры, которая могла бы обеспечить направленное и результативное формирование в структуре их личности готовности к реализации научной деятельности в сфере экологии.

Положение экологического образования в школе отражается на действительном состоянии готовности старшеклассников к исследовательской деятельности в области экологии, которое по целому ряду причин стоит оценить как не соответствующее требованиям. Педагог должен выступать не только в роли наставника, но и в качестве помощника и участника исследовательской работы. Он должен определять направление исследования, помогать учащимся выбрать тему, определить цели, задачи, методы исследования. Учитель должен направлять научные исследования в необходимом направлении. Старшеклассники должны осознавать необходимость решения экологических проблемных ситуаций, что абсолютно точно является положительной стороной направленности экологического образования в школе. На сегодняшний день обучающиеся не имеют полных представлений не только о сущности исследовательской деятельности в области экологии, но и о личной и социальной важности этой деятельности.

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**СОЦИАЛЬНАЯ НАПРАВЛЕННОСТЬ
ПОДГОТОВЛЕННОСТИ СТАРШЕКЛАССНИКОВ
К ИССЛЕДОВАТЕЛЬСКОЙ РАБОТЕ В ОБЛАСТИ
ЭКОЛОГИИ**

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Введение старшеклассников в исследовательскую работу в сфере экологии объясняется уровнем готовности к её проведению Развитие общества на современном этапе можно охарактеризовать как кризисное, при этом кризис понимается как неблагоприятные изменения формы и содержания социальных связей и отношений. Эти изменения коснулись всех сфер жизни общества, в них оказались задействованы почти все общественные и возрастные группы населения.

Противоречия, которые составляют часть этой комплексной проблемы, лежат в плоскости взаимосвязи природного и социального, и проявляются в виде кризисных процессов в разных сферах социальной жизни. К наиболее существенным мы можем отнести следующие.

Развитие технических средств привело к противоречию между физиологическими способностями отдельно взятого индивида и теми возможностями, которые открывают перед человеком современные технологии. Доказательством этого,

являются факты, указывающие на катастрофические последствия, к которым приводят необдуманные действия, начиная от обыденных, но не менее трагичных, автомобильных катастроф, и заканчивая инцидентами регионального и глобального масштабов.

Причина этого, противоречие между уровнем новых технологий и уровнем подготовки общества к пользованию технологическими новшествами. Индивидуальность человека, обусловленная биологически, противопоставлена социально-технологическому развитию человечества, в связи с появлением «информационного общества», в котором информация является более ценной, чем материальные и природные ресурсы.

Каждый человек, должен умело находить и правильно пользоваться информацией, в разнообразных ситуациях, возникающих на протяжении всей жизни.

Существует противоречие между общественным и природным началами в человеке и обществе, которое можно разрешить формированием в обществе системы ценностей, которые обеспечивают бережное отношение к окружающей среде и самим себе. Нынешний этап развития общества обостряется некоторыми противоречиями, которые проявляются в виде разнообразных проблемных ситуаций. Эти противоречия, мешают деятельности в устоявшейся форме не только индивидов, но и социальных групп и социума целиком, и потому требуют срочного решения, именно они и выступают причиной для данного исследования.

В связи с этим перед образованием стоит главная цель, оказание помощи каждому стать успешным, самостоятельным исследователем, способным к саморазвитию. Обретенные человеческие ценности, которые являются составной частью в системе общечеловеческих ценностей, не исключают их.

Наиболее благоприятным для вовлечения учащихся в исследовательскую работу является подростково-юношеский возраст. Ведущая деятельность данного периода - выраженная в различных ракурсах «социально-значимая деятельность», потому что основа для формирования психики - общение в процессе выполнения различной значимой для общества работы [3].

Исследовательская работа в сфере экологии очень важна и полезна, так как её итог способствует формированию

экологического сознания и бережного отношения к окружающей среде и самим себе. В этот период взросления главной целью является овладение более полными, глубокими знаниями, в той или иной интересующей подростка области.

Очень важно подключение учащихся к выбору профессии как субъект исследования, это активизирует самосознание и приводит к образованию профессионального самосознания, которое очень важно для подросткового возраста и является необходимым для подготовки старшеклассников к самостоятельному труду.

В подростково-юношеском возрасте, благодаря особенностям развития психики исследовательская деятельность в сфере экологии является главным фактором общественного развития подростка, а старшие классы - самое подходящее время для подготовки и реализации исследовательской деятельности в области экологии.

Сложным является постоянное нахождение индивида в условиях проблемной ситуации, поэтому исследовательская деятельность – это такая деятельность, которую человек выполняет периодически. Она необходима при столкновении человека с какой-либо проблемой.

В связи с этим, готовность к исследованию можно определить как особое состояние обучающегося, как результат определенных психических процессов, результатом которых является деятельность, направленная на решение какой-либо задачи, получение определенного результата.

Достаточно важное место в подготовке учащихся к исследовательской деятельности имеет возникновение у них позиции. Позиция отличается от установки, она не опережает учение, а, наоборот, формируется в процессе обучения, основываясь на установке.

Готовность обучающихся к исследовательской деятельности определяется как качество личности, содержащее в себе комплекс определенных знаний, умений, навыков и установки на исследовательские действия, формирующиеся в процессе познания и преобразования индивидом самого себя.

Учитывая сказанное, определим готовность к исследовательской деятельности как - способность человека к

определению, изучению и решению проблемных ситуаций в различных научных областях и в сфере экологии.

Сфера экологии, рассмотренная как область знаний, является комплексным направлением науки [2].

Оказывая на личность основополагающее воздействие, общество воздействует на обучающихся комплексом социализирующих факторов, которые определяют среду социального становления[1].

Сфера экологии как среда социального формирования играет большую роль для старшеклассника как комплекс многочисленных параметров и отношений социальной, природной и антропогенной направленности, которые воспринимаются им как реализуемая возможность для работы. Действуя в этой области, обучающиеся сознательно делают выбор.

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ACTUAL PROBLEMS OF THE HUMANITIES AND SOCIAL SCIENCES

Bendik I.A.

DYNAMICS OF DEVELOPMENT OF REFLECTION AMONG COLLEGE STUDENTS AT VARIOUS STAGES OF PROFESSIONAL TRAINING

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Abstract: The article deals with the problem of the influence of reflection on the formation of professional competence of College students and outlines data of the study.

Key words: reflection, reflexivity, competence, professional competence and professionalism.

Introduction. Research in the area of reflection due to the growing importance of reflection in terms of the competence approach in education, the purpose of which is to ensure the quality of training of specialists taking into account the prospects of socio-economic development of the country, competitive on the labor market, able to work effectively at the level of world standards, ready for continuous personal and professional growth, with social and professional mobility. In such a situation from the College students requires the development of a professional competence as a result of the content of professional training of specialists of high qualification. There is a problem of reflection reflection as a psychological factor of formation of professional competence.

The purpose of the study is to identify the level of development of reflection among students in various stages of preparation for the profession.

Methodology. The need for inclusion in the scientific analysis of the phenomenon of reflection is particularly important due to the fact that the reflection provides a specialist understanding of one's own inner world, the self-organization of internal States and meaningfulness of professional activity. According to A. A. Derkach, a higher degree of

ownership of the reflection indicates a higher level of professionalism [4].

The value of reflection for professional is that the capacity for reflection and the knowledge of its mechanisms allows to form their own values and principles, determine the strategy of its development.

To date, there is a wealth of phenomenological information on the problem of reflection.

The attention of a number of scientists facing the problem of the influence of reflection on the formation of professional competence of the individual. So, the work of A. p., Gureeva dedicated to the formation of reflection in teacher's professional activity [1]. I. A. Mushkin clearly shows that pedagogical reflection is the basis of improvement of professional skill of the teacher [7]. N. B. Krashennnikov describes the process of development of pedagogical reflection as a condition of training of future teacher to professional activity [5]. N. And. Guslyakova consider pedagogical reflection as the psychological mechanism of formation of professional consciousness [2]. Research of these authors confirms the position that in the educational process, particularly professional College, reflection is one component activity, and, therefore, reflexive competence is an important component of professional education.

Research on professional competence, more appealing to the phenomenon of reflection, considering it as a substantial element, and as a condition of its development (V. N. Vvedensky, N. Dudkina, L. Kupriyanova, A. G. Bermus, N. F. Efremov, I. A. Winter, D. S. Tsodikova).

In educational psychology the influence of reflection on the formation of professional competence of College students in fact were not considered. Our study attempts to fill this gap in scientific knowledge.

To determine the level of reflection of students from different courses, we conducted an empirical study. To this end, we used different methods and tests. In the structure of the experiment involved 147 of I-IV courses. The study of reflection and reflexive opportunities in the learning process of students from first to fourth courses, the following data were obtained: most of the students I and II course have a low level of development of reflection (78%), the students of the fourth year is essentially the average level of reflection (63%).

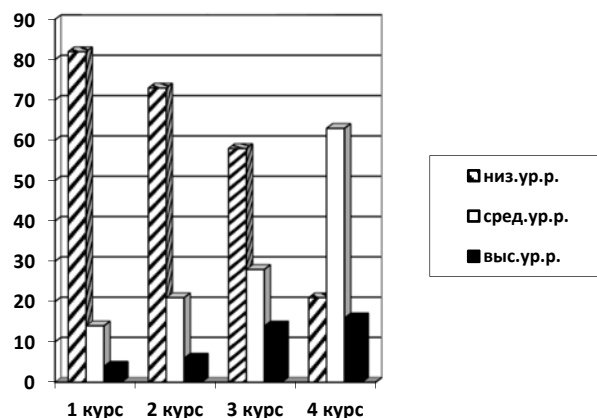


Figure 1. Levels of reflection from students I,II,III,IV courses

Conclusion. The data of our study support the idea that without the creation of conditions for development of reflection formation of professional competence is carried out less efficiently. In this connection it is necessary to develop the reflection of College students in the process of learning activities and extra-curricular (training) activities of the student as it is (extra-curricular), is a priori more favourable motivational and attractive and psychologically comfortable for the student.

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**THE SUPPORT OF INDIVIDUALIZATION THROUGH
NETWORKED EDUCATION PROGRAMS**

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Annotation. The interests of a child and the design of educational process based on modern pedagogical technologies, also the creation of an open educational environment, the development of the innovative thinking of the teacher himself show us a request for the organization of a network educational process model. Such integrative nature of this way activities reflect in individual educational way of participants based on possibilities in over educational environment in the meta-subject center "NOUROKI" SUSURGPU.

Key words: individualization, pedagogical technologies, networked education programs, individual educational way, educational environment.

New objectives of modern educational system need a new teacher, who can create its pedagogical system according to ideas of multicultural human progress. The orientation to educational interests of the child, the design of the pedagogical process on the base of modern pedagogical technologies, the creation of an open educational environment, the development of the innovative thinking of the teacher himself – these questions considering in the new standard generation as priorities professional objects. The priority way is the usage of new approach to prepare future teachers during study.

The innovation approach in training and retraining staff for educational system we are to regard new educational methods, new ways of lesson structure, also new ways retraining programs that directed on to a new approach to educational quality. These are distant educational programs, creation net-based educational courses, tutoring, and creation integrative meta-subject courses to educate the other professional groups such as teachers of primary school, teachers of elevation school, experts, and educational managers.

To get through individualization we use meta-subject approach as a main way in educational process. This way help us to go away from parts of knowledge by definite subjects. This approach allows comprehending it in practice, ensuring that continuity of all educational levels.

We create net-based educational programs co-based on meta-subject approach according to request with the participants from net-organizations. During these programs the students developing the definite way that prefer. They learning to design a new level of educational field. The theutor in our educational programs worked with interest of students to situations that increase theirs person associate with pedagogical mechanisms. This occur to participate in other conditions that transform obvious behavior, made them demonstrate more types of communication. [1]

The next we should mentioned is the usage of reflexive analyses. The main process as comprehension of definite situation that occur in all the positions. It helps us to reconstruct the process of inquiring person interest to make it out of obliged and participate in other new roles to get more experience in teacher profession.

The priority way in new educational standards of all system levels in common is the form of possibilities to interest in all subjects. All children are to use their possibilities in corporation and partnership with adult. It supposed to make the child the main person of educational corporation. It also supposed to support children by its own.

The studying method we are using to interested future teachers in process of creation the studying event. All participants use the possibilities in over educational environment in the meta-subject center "NOUROKI". The goal of events is increasing the meta-subject results included the possibility of usage in universal abilities. They are the ability to interest, the ability to manipulate of knowledge, ability to

communicate that are the base of studying process. It is also the way of individualization of future teacher to improve his abilities associate with children in these events.

The next educational level increase the ability in meta-subject activity to ability of searching, planning and realized studying projects, and social activities. In addition, of course all the universal types of abilities apply to these ways.

Educational events are to use in net-educational programs allows the participants to actualize individualization way of this corporation. They allow to plan, to search, to socialize, to corporate, and to create consciously. All these process eager to realize together with adults and peers. It is one of the goals in own individualization way.

We are creating for participants' integrative possibilities in over educational interactive environment to plan the project in actual conditions. They might be used by realize the abilities.

Laboratories in the meta-subject center "NOUROKI" are the definite integrative organization form to collaborate study, science, innovations, and the potential of professors of our university for common work in studying and learning. This collaboration also founded for creation net-based courses that facilitate different educational organizations to solve modern studying and learning task.

This approach give as many abilities professional training of students in subject areas, namely, directed to the preparation of a modern graduate of the Bachelor's and Master's degree in the direction of Pedagogical Education. In accordance with the requirements of standards in the field of pedagogical, methodical, research, cultural, educational and project activities in the subject areas of natural-mathematical and technological education through implementation.[2]

Very important is the development of the university's scientific potential through joint research work of network partners, the formation of a quality personnel reserve from among the most gifted and inclined to scientific and teaching activities of students who implement an individual educational trajectory are included in the implementation of subject integrative cognitive projects.

The peculiarity of the meta-subject laboratory "NEUROKI" of the Since Faculty was the over-filled multifunctional educational environment related to the subject areas of biology, chemistry, physics, and geography, computer science, specially created with the help of

Scientific Entertainment LLC (Moscow). In the process of preparing a teacher, according to the requirements of the standard, an important methodological task is to prepare students for the organization of design, research, and cultural-educational activities. In front of the since teacher the task of forming a scientific type of thinking, scientific ideas about key theories, the formation of a scientific picture of the world.

Among the objective results of the development of chemistry: the formation of ideas about the natural connection and cognition of natural phenomena, the objectivity of scientific knowledge. The system-forming role of chemistry and biology for the development of other natural sciences, engineering and technology; understanding of the fundamentals and principles of the operation (work) and mechanisms, vehicles and communications, household appliances, industrial technological processes, their influence on the environment. Awareness of the possible causes of man-made and environmental disasters, and awareness of the need to apply the achievements of science and technology for environmental management, the formation of ideas about irrational use of natural resources and energy, pollution of the environment as a result of imperfections of machines and mechanisms.

The process ensure openness and continuity of education in university partnership systems with educational organizations implementing training in the direction of pedagogical education, interaction with educational organizations in Chelyabinsk and the Chelyabinsk region through conducting refresher courses (including scientific and methodological seminars, open lessons, master classes, classes, round tables).

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**THE FORMATION OF VALUE-SEMANTIC SPHERE OF THE
FUTURE TEACHER'S PERSONALITY**

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Abstract. The author considers the problems of formation of value-semantic sphere of the future teachers' personality. The formation of value orientation and personal meaning of the future teachers take place in pedagogical university via the organization of educational and extracurricular activities of students.

Key words: value-semantic sphere of the personality, values, personal meaning, professional training, educational activity, extracurricular activity.

The modern system of education focused on the principles of humanism, it provides special attention to the formation of value orientation and personal meaning of the future teachers' personality. The value orientations are part of the system of personal senses. Value orientation, as does the personal meaning, formed and changed throughout human life since childhood. In student age there is a further development of value-semantic sphere of personality.

For the development of value-semantic orientations, it is necessary that they were always actualized, realized, because they have dynamic character [1].

During education of students in pedagogical university the interiorization of socially significant values happens through the assimilation of social standards in the process of learning, communication, participation in extracurricular activities.

In the classroom disciplines of psycho-pedagogical cycle took place the preparation of students to implement the educational process in future professional activity. Students see the education as a process of different aspects and trends, different concepts of values, attitudes

and personal qualities of the individuality, the methods of educational programs. In the practical training creates a special emotional atmosphere, which the factor condition for the internalization of values along with the mental factor.

The formation of value orientations and personal meaning, spiritual-moral education of future teachers is realized in the participation of students in extracurricular activities, it's voluntary participation in the activities of student educational and other relevant units of volunteer movements [2]; the participation of students in all types of creative activities, use of dialogue «teacher – student» as a method of training and education. The formation of future teachers' personality should be based on axiological bases of education. Pedagogy of higher education is currently facing the same values of spiritual life, spiritual world and human relations. The main function of education becomes not only the formation of high intellect, but education and developed personality with high ideals and goals.

A special role in the spiritual and moral development of students is the museum. Actively participating in the educational process, it's have great importance in the formation of civil patriotic position of the younger generation, having the required educational base - substantial exposure, materials, etc [3].

Value-semantic orientations are formed, developed and changed in the process of activity. The inclusion of students in socially meaningful activities stimulates the development of future teacher' personality and its formation of value orientations.

Students actively participate in organization of events for children with special needs, for typical children, they showing organizational, communication skills, developing professionally important qualities, necessary for further work with children, but most importantly it helps to form an active civic position of a future teacher. These qualities contribute to the formation of future teachers' morality [4].

Scientists argues that today there is a necessity of formation of moral value orientation and attitudes that may determine the alignment of personal interest with the public, the regulation of people's actions so that they serve the common good [5]. Also, this activity contributes to professional and personal self-development of students through

selective attitude to the environment, personal choice of subject position.

The mentors play a huge role in creating of emotional atmosphere, the formation of professional attitudes and value orientations of future teachers. The system of supervision that provides direct help to students in adapting to new social conditions, it's contributes to the formation of active life position of future teachers, formation of their professionally important qualities and life values [6].

Thus, in our opinion the main aspects of professional training of future teachers and formation of valuable orientations is the formation of the educational and learning sphere, which conducive to the development of key competences; formation and development of spiritual-moral, civic and patriotic, cultural-aesthetic, moral and social orientations and attitudes, personal and professional qualities of the teacher; formation of professionally-personal position of students.

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**THE PROBLEM OF PROFESSIONAL RESPONSIBILITY OF
THE JOURNALIST ON RUSSIAN FEDERAL TV CHANNELS**

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Abstract: The article deals with modern television speech culture, which reflects the needs of the community, has a large inventory of cultural information, and the exchange of this information. It also draws on the tradition of the Living Word to mediate between people.

Keywords: television speech culture, social dialogue, rhetorical image

Communication is part of major constituents of human existence. The new forms of technical equipments have largely extended its borders and provide new communication opportunities for people and particularly for an individual to have his/her say and be heard by many. Currently the list of these new means of communication is headed by television, despite the predictions by many social and TV analysts that the advent of Internet is going to challenge its leading position in the system of mass media. However, TV still remains popular and retains its leading role as media.

TV today has become a very important medium between governing authorities and the people. The main features and peculiarities of the current social, political and economic policy of the government at power find their reflection in the structure, content and

the form of presentation of TV programs. Communication via TV “has retained in its structure gradual stages of psychological handling of information conceived by people”. [4. 11-12].

TV audience perceives information through the personality of the anchorpersons they sympathize, trust and believe. Targeting public opinion and influencing the behavior of the audience largely depends on the professional skills of the journalist, his social and political visions, his educational background, his preferences and streaming. The question here is about the concept of the personalized information. The news the anchorperson reads on air imposes on the audience through his/her personal qualities, their moral and emotional features and insights and the way they introduce and interpret the facts and the events.

Professional and moral creeds, insights, the visions on the world around based on the traditional values make the speeches understandable, emotional for the TV viewers, respect the interests and rights of the society and individuals on true and checked information. In practice trust and sympathy of the audience to this kind of journalists proves the rightness of observance of these norms and values that correspond to general human visions and demands on responsibility, justice and duties.

The existence of the concept of "professional duty" reflects the aspect of professional and moral relations that emerges from the essence of journalism and motivates the journalist to the actions necessary for the realization of professional duties. The aspects of professional and moral relations are also closely related to the categories "professional responsibility" and "professional conscience".

Professional responsibility is an objective basis for the professional activity. It makes the journalist feel responsible for the consequences of what he announces.

Initially any professional activity is oriented on satisfaction of these or those social demands and consequently aspires the results to be perceived positively by the society. But the circumstances can alter the cases. They are able to lower significantly the aspiration and set it on to the direction of negative perceiving, as far as the statistics of social phenomena and our probable knowledge on future stipulates the impossibility to predict the development of many events in many areas of human activity, give a detail and proper analysis and description to

them. That means that any professional and creative activity, at this or that extent, is doomed to unpredictable consequences. In these cases, a professional interested in achieving positive results as an ultimate goal quite has to take into account the possible alternate options or coming outs when making decisions: success – failure, positive – negative, demolishing or originative consequences. Such type of decision making and the professional activity itself with possible alternative coming out mates with some risks that is significant for the professional responsibility. The thing is that being creative means to create realities where there are no absolute analogues and hence essentially it is connected with some indefiniteness. And as far as it is impossible to bypass the risk then it might be justified and accessible. But the extent of accessible risk may change depending on objective necessity of action at a certain moment and significance of the motives. The more acute is the need in the results of the activity and rational the motives the better is the reason for decision making with alternative variant. The regulative role in this process practically goes to moral phenomena framed as ‘responsibility’.

A person endowed with professional responsibility guarantees conscientious fulfillment of professional commitments. Generally, it is a way to minimize the negative consequences for the society itself and the journalist. The higher is the risky area of activity the higher are the demands for professional responsibility.

Conclusion: TV today is a mirror in which the whole of what we are, our lifestyle and values are reflected, including communication culture between ordinary people, people and state officials and the cross-cultural relationships. In recent years, there’s happened a noticeable distortion of people’s perceiving the idea of the value system. The society has become more brutal, intolerant, aggressive and rude. The role of television is great in this process.

What previously was considered as ethically unacceptable is now seen as a permissible and allowable rate. This shift in the spiritual and moral values of people and their behavior impacts badly the relationship between members of society, and men feel uncomfortable surrounded by people who are disrespectful, and often enemy relate to each other, show faux pas and deliberateness in discussions with their respondents.

Television possesses a great potential to influence positively or negatively the speech and behavioral culture of a human being. It can also strongly contribute to his development and education transmitting true and checked information.

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Lucio Giuliiodori

**ARE WE STILL IN NEED OF DREAMING?
REFLECTIONS ON CONTEMPORARY SURREALISM**

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Abstract: *As Jung taught, the unconscious manifests itself through images and Surrealist painting is known as the art engaged in displaying the unconscious' contents. Since visualizing something brings about a conceptualization of it, Surrealism could be considered a way both to paint and to investigate the unconscious. This paper aims to set out this dual function of Surrealism.*

Keywords: Unconscious, Surrealism, Carl Gustav Jung, Psychology, Philosophy of Art, Dino Valls, Avant-garde, Dreaming, Contemporary Painting.

If Surrealism is the only Avant-garde still alive, there should be a reason. Surrealism was born under the strong influence of Freud and his theories about the unconscious which *at that time* was a brand new

concept. Here we are though: it is still brand new. Science hasn't deciphered it, philosophers have lost their way toward it and psychologists deal with it, without knowing exactly what it is.

Are we still in need of dreaming then? Of course we are. The call to the mysterious is always deeply fascinating and the unconscious is one of those mysteries still far from being unveiled. That is why Surrealism is still a very lively artistic current which has found its path not only on painting but on literature and cinema too, let us mention Alejandro Jodorowsky as a good example of a contemporary surrealist, both a writer and a film maker.

So, getting around to the point, the oneiric realm is where the unconscious sets free, where it acts – remembering Jung: “the unconscious is real because it acts” [1]. According to the Swiss psychiatrist, it always acts, both in the vigil and when we dream, the matter is “we recognize it only when we are unconscious”, i.e. when we dream. During this state of mind the conscious mind is usually asleep (unless we have a lucid dream), therefore the dream is literally “invaded” by the unconscious. However, there are many techniques which teach to be aware of the unconscious even we are awake, characters as Jung, Gurdjeff, even Jodorowsky himself (with his concept of psychomagic), let alone Castaneda, speak about them extensively.

The unconscious is a concept which, since it was born, has been investigated by different categories of thinkers, spiritual masters included – what meditation is if not an attempt to “break into” the inner world?

Not only every night we deal with the unconscious but every day too then: when we experience a synchronicity [2] we actually have to witness a real interaction between the inner and the outer world. Some artists have been fascinated by all this and embarked in a meticulous and extremely interesting study: Surrealist paintings, indeed. Jeffrey Raff, a student of Jung says: «Jung also believed that the contents of the unconscious, including complexes and archetypes, had the ability to manifest themselves through images. We can think of the psyche as a chaotic place in which each part is capable of generating its own image» [3]. Now we understand why painting is relevant in researching the unconscious. Numerous are the artists active nowadays, it is even difficult naming a few since many, and not few, are worthy to

be mentioned. However, I sense Dino Valls is the one who to a greater extent considers painting as an alternative way of inner investigation, his goal is trying to photograph the unconscious, as he clearly states: «There are many artists that were intended to represent only beauty, the celebration of life. I was instead given to represent the existential vertigo.

The figures I paint are incarnations of the subconscious-projection of my soul.

Just like a psycho-analyst-easel.

There, psychoanalysis walls and mirrors of the collective unconscious are exposed. Sciences and religions claim to explain the eternal question of the meaning of existence, the profound dichotomy between the material and the spiritual. Art must unite this duality; its realm is the space between one and the other» [4].

Valls shows us how urgent is getting the answers as we are still practically ignoring our true nature; through his art he seem to tell us we are not only matter as the figures he paints are coming from within, indeed the psyche's realm.

So, we are not in need of dreaming, rather we are in need of understanding what dreams are, in so far as we do that, we manage to spot the unconscious' secrets which leads to surrealists' main concern. The unconscious is seen as a realm of freedom too: «Surrealism as a way into mental world of endless possibility, a certain point of the mind at which life and death, the real and the imagined, past and future, the communicable and the incommunicable, high and low, cease to be perceived as contradictions» [5].

The understanding of this huge matter is then overpowering because as Valls stated, it unifies the material and the spiritual: art, philosophy, psychology and science are all involved here. The consequences would be crucial for the progress of knowledge, as well as for our everyday life: unveiling the dark side of ourselves, *painted* when we dream even though we are not aware we have *painted* them.

If artists try to portray the unconscious through images, we do it through dreams: the challenge is being aware while we do it, the challenge is to comprehend why, how and when exactly we do it, the challenge is to unify the conscious and the unconscious in the end, the spiritual and the material, art and science – as Valls says. The goal is to

contemplate reality in its entirety, we included. Surrealism has its way into it as depicting that realm is an artistic attempt of possessing it.

If Realism is only a mere reproduction of physical reality, Surrealism is a desperate attempt to reproduce the metaphysical reality – I here use the term in its literary meaning of going beyond physics. Since science failed in that reproduction (codification) [6], we could always rely on art whose effort is remarkable and persistent. Images show us what the unconscious could be, each artist paints its own but the archetypes often come out, reminding us of the collective unconscious.

In conclusion Surrealist painting is the only window we have to look at the unknown which thanks to art has become more and more brighter, it doesn't scare anymore, rather, as a mirror, it helps us to show who we really are.

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Nigmatzyanova Yu.L.
**ON THE CATEGORY OF ALIENABLE AND INALIENABLE
POSSESSION IN ENGLISH AND TATAR**

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Abstract: The category of possession has several subcategories including the category of alienable and inalienable possession. In the article the attempt to illustrate different types of possession using the examples from fiction in English and Tatar has been made.

Keywords: category of possession, inalienable possession, alienable possession.

In linguistics inalienable possession is a type of possession in which a noun is obligatorily possessed by its possessor. For instance, *a leg* implies that it is somebody's leg, *a mother* implies that it is someone's mother. Other things, such as most objects, may or may not be possessed. When these types of objects are possessed, the possession is alienable. Alienable possession is generally used for items which one might cease to own (e.g. *his house*). Many languages reflect the distinction between alienable and inalienable possession, but they vary in the way they mark it [1]. Possession constructions involve two nouns: the possessor and the possessee (the noun which is possessed) [2].

In the article the attempt to illustrate some types of possession using the examples from fiction in English and Tatar has been made.

I. Inalienable possession.

1) inalienable, internal possession

a) X is a possessor of Y, if Y is a body part (a leg, arm, eye, etc.)

- *Then Hugo relaxed and drew his feet back into bed* [3, p. 105].

- *Clutching her shrunken bosom with her left hand, she raised her right drunkenly, and pointed her finger at Mary* [4, p. 211].

- *Башың түбән иеп утырган да уң кулы белән эскамия кырыена ябышкан* [5, p. 7].

- Жырдан кызып киткән капитан өстәлгә йодрыгын сукты – бу аның тынлык таләп итәм диюе иде [6, p. 10].

b) X is a possessor of Y if Y is a mental state, process, event

- ...she hadn't in the least attempted to overcome her stupidity [7, p. 26].

- He panted with his fury [8, p. 196].

- Arthur pushed aside the glass of water held out to him, ...and rested his forehead on one hand and tried to collect his thoughts [9, p. 66].

- Полковникның түземе төкәнде күрәсең [5, p. 48].

- Ташка әйләнгән бәгыре хәсрәтләрен фәкать физик авырлык сыман итеп кенә тоя башлады [5, p. 239].

- Аның өчен иң аянычы шул булды – тышкы дөньядан аерылу аркасында, аның диндарлыгы да көннән – көн кими барды [5, p. 54].

c) X is a possessor of Y if Y is a time period of X's existence

- Frederick was then a young actor who had just finished his first season with a repertory theatre [7, p. 23].

- Аның сөйләвенә караганда, капитан бөтен гомерен иң явыз башкисәрләр арасында үткәргән [6, p. 8].

d) X is a possessor of Y if Y is an action taken by X, a result of X's action

- The gendarmes, meanwhile, had finished their search, and the officer in charge requested Arthur to put on his outdoor clothes [9, p. 54].

- Кардинал фатихасын бирдеме соң? [5, p. 193].

2) inalienable, external possession

X is a possessor of Y, if Y is a relative in the family.

This type of possession is external: family members, relatives are not part of the possessor.

- *With a start Mary turned and looked at her mother dumbly* [4, p. 197].

- *Этием ике көннең берендә, тракторны ябарга туры киләчәк, капитан бар кешене биздереп бетерә инде дин сукрана* [6, p. 8].

In this case, blood relatives are always in the sphere of the possessor's inalienable possession, but if we mean, for example, one's wife, then this possession can become alienable for some reason.

3) relatively inalienable, external

X is a possessor of Y, if Y is a non-family member (a friend, neighbor, colleague who can change over time)

- *He had been to visit his friend, and had stayed with him for seven years* [10, p. 33].

II. Alienable possession.

X is a possessor of Y, if Y is an item which one might cease to own at some point.

If the object of possession is taken from the possessor, he/she does not cease to be identical with himself/herself and will continue to exist, but without that object.

- *When he rose to take his hat, the Director interfered, laughing* [9, p. 41].

- *Кизгәвен күен дәфтәрәннән бер бит ертып алды да карандаш белән нидер язды* [5, p. 217].

One can possess an item for a long or short period of time.

- *Zita threw away her cigarette* [9, p. 201].

An object can be considered possessed if it is used by X on the basis of an arrangement. So, depending on the context the phrase 'X's book' can mean:

- 1) X's own book;
- 2) one's book that X is using.

For instance, Mrs. Brodie has come to visit Agnes Moir, and the chair in which she is sitting is Miss Moir's, but a combination "her chair" is in the sentence.

- ...Mrs. Brodie...sat huddled in her chair before the stove...[4, p. 266].

For example, Denis is not the owner of the window of the compartment in which he is traveling:

- Denis again lowered his window and looked out [4, p. 234].

In the following example a passing carriage is being used.

- “Mme. Reni is just coming out, I think; her carriage is waiting for her” [9, p. 152].

“...Коляскасы кәтә инде...” [5, p. 136].

The analysis has shown that all considered examples from fiction in English and Tatar contain possessive markers conveying the meaning of alienable and inalienable possession: possessive affixes (suffixes) in Tatar and possessive adjectives – in English.

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**MODEL OF THE DEVELOPMENT OF EMPATHY TAKING
INTO ACCOUNT PROPERTIES OF TEMPERAMENT AMONG
STUDENTS OF THE SECONDARY SCHOOL**

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Abstract: This article considers the problem of the development of empathy, taking into account the properties of temperament of the students of the basic school. A theoretical model of the development of empathy with regard to the properties of temperament is presented. The model is understood as the optimal representation of the content and structure of all components of a holistic pedagogical process aimed at developing empathy, based on the temperament of the students of the basic school.

Keywords: individual, empathy, emotions, temperament, development model.

In modern studies, the concept of empathy is considered in various research contexts. Thus, empathy is studied as the ability of the individual to empathize with the emotional experience of another person, as the ability to understand his feelings and thoughts, as the ability to be able to take the position of another individual [2; 5; 6]. Along with this, there are numerous studies that are devoted to the problem of studying the properties of temperament [4; 6; 9]. And if we consider temperament as a natural ratio of stable individual characteristics of a person, then empathy is a reflection of the properties of temperament, which characterize the various aspects of the dynamics of mental processes.

If we turn to the analysis of scientific literature, it is worth noting that the problem of determining the essence of the empathy of subjects of the educational process, its functions and development conditions in science is not new. However, the available studies (T.A. Akhryamkina, D.V. Belykh, E.D. Makarova, E.V. Ryazanov) do not affect the

development of empathy, but rather consider approaches to studying the specific features of empathy in the structure of the personality.

Analyzing scientific views on the problem of empathy, we can distinguish two main components in the work of the mechanism of empathy [4; 7; 8]:

1) the emotional component, or the emotional response to the state of another individual, which often, but does not always involve the separation of the emotions of the other person.

2) cognitive ability to take the position of another, while separating oneself from the other. The cognitive component is often associated with the work of the mental model. It should be noted that the emotional component in the development of the mechanism of empathy in ontogeny begins its work earlier than the cognitive one, while both components can develop unevenly [7]. We also note that to date scientists have made great progress in understanding the development of each of the components, but they could not come to an understanding of the model of interaction of both in the structure of empathic behavior [7]. Traditionally, the development of empathy is seen as the process of accumulating changes in components necessary to perform tasks in teaching in accordance with its goals and trainee characteristics.

Noting the fruitfulness of the carried out studies, it should be emphasized that in pedagogical psychology the problem of the development of empathy, taking into account the temperament properties of the students of the basic school, has not yet been fully understood. The need to fill this gap in scientific knowledge determines the relevance of our research.

Based on the theoretical material, we created a model for the development of empathy, taking into account the temperament properties of the students of the main school. By model we mean an optimal representation of the content and structure of all components of a holistic pedagogical process aimed at developing empathy, taking into account the temperament of the students of the main school (Figure 1).

The systematizing element of the model is *the target block*. It is associated with the definition of individualized target orientations of the process of development of empathy, taking into account the properties of temperament, as well as solving problems presupposing the

realization of the principles of an activity-oriented and personally oriented approach.

Substantially organizational block defines general characteristics of the organization of development of empathy taking into account properties of temperament. Its main objective is a systematization of subject maintenance of the offered complex of knowledge, abilities, skills and personal qualities and also features of influence on development of empathy taking into account properties of temperament that determines the potential of her use in the conditions of modern education and also includes stages of development of empathy. The research conducted in this paper has shown that purposeful development of empathy taking into account properties of temperament demands development of the special program from students of the main school. The offered program is information practice – the focused basis substantially organizational block.

The *functional block* represents demonstration of ways of development of empathy during which at students significant personal qualities and understanding of each other develop.

Estimated – productive block analyzes degree of compliance of the received and planned results and also realizes conditions of development of further work.

As a whole, the model developed in our study and the conducted research on the basis of comparison of the data of the ascertaining experiment, allowed to establish in advance the following:

1) mechanisms of development of empathy, taking into account the properties of temperament are: reflexion as a process of accumulation of emotional experience, based on the realization of one's own actions and deeds, states, emotions, feelings, experiences; motivation as an impulse for action, based on the desire to satisfy the needs; educational process in the school as a purposeful organized interaction of students;

2) the most significant psychological conditions for the effectiveness of the development of empathy, taking into account the temperament characteristics of the students of the basic school are: creating opportunities for self-discovery, self-realization and self-development of empathy, taking into account the properties of temperament in learning and providing a combination of positive emotional and information functions of classes;

3) the main didactic conditions are: creation in the educational process of situations aimed at understanding the students about the role and place of empathy in it and ensuring the tendency of a consistent change in the forms of interaction from the masses to the individual, from the reproductive to the creative ones.

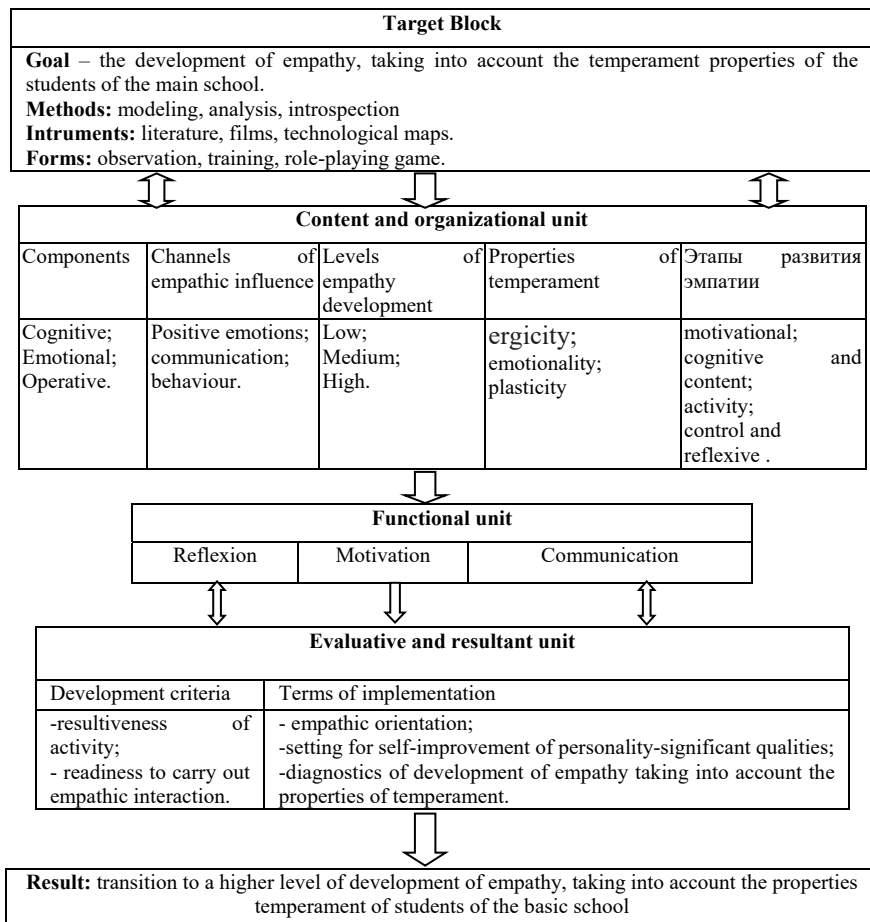


Figure 1. The model of the development of empathy based on the temperament properties of the students of the main school

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**PSYCHOLOGICAL AND PEDAGOGICAL ASPECTS OF THE
FORMATION OF RESPONSIBILITY IN ADOLESCENCE**

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Abstract: The article considers the phenomenon of responsibility, the problems and aspects of development of responsibility in adolescence.

Keywords: responsibility, the psychology of responsibility, adolescence, teenagers, cadets.

Almost thirty five years have passed since the publication of the monograph by Kuanyshbek Muzdybaev "The Psychology of Responsibility" (1983). In the second edition of this work, published in 2010, the author "didn't seek to write a book in accordance with international standards, some features of that era are still inherent" [2, 4]. The author also pointed out that new interpretations, dedicated to the psychological aspects of responsibility, are not put forward.

However, at present the problem of the phenomenon of responsibility is becoming more urgent. The above monograph is a "scientific encyclopaedia" on the interdisciplinary problem of the phenomenon of responsibility in psychological research in our country, and is also mentioned and quoted in many foreign publications. So, in most scientific articles, dissertational psychological research, we find references in the bibliographic list to the work of K. Muzdybaev "Psychology of responsibility".

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The understanding of the relevance of the problem of responsibility at the present stage of the society and Russian education

development is evidenced by the provisions of the "Strategy for the Development of Education in the Russian Federation for the Period until 2025" [3]. The "Strategy" specifies the psychological and pedagogical conditions for educating the children of active citizenship, civil responsibility, which is based on the traditional spiritual, cultural and moral values of Russian society, as well as the development of responsibility in the educational space, the principles of collectivism. The psychological factors and conditions for the formation of responsibility in adolescence are of a particular relevance.

In the modern psychological and educational literature there are many definitions of the phenomenon of responsibility. The authors of these definitions consider the notion "responsibility" as: 1) readiness 2) dependence, 3) control, 4) duty, 5) property of the individual. We have also analyzed the definitions of the concept of "responsibility" in psychological dictionaries.

Thus, the analysis of psychological literature has shown that in many psychological dictionaries there is no definition of the concept of "responsibility". This shows, firstly, the multiple approaches to the study of the phenomenon of responsibility in other areas of scientific knowledge, and secondly, the contradictions in modern psychological science in the definition of this concept. Moreover, many definitions duplicate and repeat the main meaning of this phenomenon.

In the psychological literature, multiple approaches to the structure of the phenomenon of responsibility are presented. For example, A.N. Usacheva, allocates the following components of responsibility: 1) cognitive-evaluative; 2) emotionally-volitional; 3) behavioral [4,9].

A.I. Krupnov (1995), within the multidimensional - functional approach, distinguishes the following components of responsibility: 1) dynamic; 2) motivational; 3) cognitive; 4) emotional; 5) productive appraisal; 6) regulatory-volitional [1,8].

In the current conditions of the educational process, conditions are not created for the implementation of the fundamental principles of *a responsible attitude toward learning, taking into account the age characteristics of adolescence*. It is this theoretical and methodological approach, which makes it possible to investigate the phenomenon of responsibility, becoming topical at the present time.

Responsibility is closely related to human behavior. The main psychological determinants of responsibility include: 1) morality; 2) will; 3) intelligence.

So, O.S. Chalikova points out that the "will" forms a single cluster with responsibility, or is included in the clusters adjacent to it [5,146].

Students who study in the cadet classes of a general education organization participate in the formation of *environmental responsibility* - as one of the types of responsibility, both in chemistry and biology classes, and in extra-curricular activities. Active participation in actions, contests, competitions and forums of ecological orientation of various levels has a positive impact on students and acts as an *internal psychological factor of motivation*.

Thus, the most active participation of students studying in cadet classes of general education organizations of the city of Chelyabinsk was noted precisely in actions and activities of an environmental focus.

Analysis of modern psychological literature has shown that at the present stage there is insufficient research on the formation of responsibility in adolescence and older age. Thus, most authors point to the formation of responsibility in the younger school age, among students, students of cadet corps.

At present, we are carrying out experimental and experimental work on the development and testing of a psychological and pedagogical model for the formation of the responsibility of students of the cadet classes of a general education organization.

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**THE ROLE OF THE CURATOR IN THE CIVILIAN-
PATRIOTIC EDUCATION OF STUDENTS OF THE
PEDAGOGICAL UNIVERSITY**

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Annotation: The paper analyzes the role of curator in the formation of civic-patriotic education of future teachers. Some forms of work with students on the education of citizenship and patriotism are introduced in the research.

Keywords: personality, curator, students, civil-patriotic education, education, future teachers, qualities, formation.

Changes in our country require new approaches to solving the problems facing the education system in Russia. The social order of the state in education is aimed at educating a person who is ready to make decisions independently in a choice situation [6]. At present, the features of the current process of preparing future teachers are considered within the framework of the federal state educational standard in higher education institutions [3]. Today, the educational

process has acquired a humanistic character, which makes it possible to expand the requirements for the personality of the teacher-educator, which should perform the function of transferring social experience to the younger generation and creating conditions for the development of the child's personality, the formation of his civic, patriotic and moral qualities. The problem of civil-patriotic education of modern youth is being actively discussed today not only in the sphere of education among authoritative Russian scientists, but also among well-known politicians at the state level [7].

Raising the sense of patriotism in the youth environment [5], the education of a patriotic citizen is the common goal of the educational system of Russia, which was reflected in the Law of Russian Federation "On Education" and in the state program "Patriotic Education of Citizens of the Russian Federation for 2016-2020". Thus, in The State Program "Patriotic Education of Citizens of the Russian Federation for 2016-2020" states that "taking into account the current tasks of the development of the Russian Federation, the goal of the state policy in the sphere of patriotic education is the creation of conditions for raising civil responsibility for the fate of the country, increasing the level of consolidation of society for solving the tasks of ensuring national security and sustainable development of the Russian Federation, strengthening the sense of ownership of citizens to the great history and culture of Russia, ensuring the continuity of generations of Russians, educating a citizen who loves his homeland and family, which has an active life position "[1].

Note that today in the South Ural State Humanitarian and Pedagogical University the most important condition for professional training is the creation of an academic and educational space [8]. At the natural-technological faculty of the SUSU, for many years an effective curatorial system has developed. The curator of the academic group is guided in its work by the Law on Education in the Russian Federation, Federal State Educational Standard of Higher Education and other normative documents, as well as by local regulations: the University Charter, the Internal Regulations of the University, the regulations, the orders of the university rector and the orders of the pro-rector for educational work, educational process, and introduces them to the students of the academic group. [4]. One of the priorities of the curator is the formation of citizenship and patriotism among students.

Here are examples of the activities included in the work plan of the curator and aimed at the implementation of civic-patriotic education: the curator's workshop "Day of Knowledge", "Teacher is ...", etc.; round tables and discussions devoted to the Day of Tolerance, the Day of National Unity, "ISIS is a threat to humanity" (within the framework of the university "Week of Legal Culture"), "Our True Nationality is Humanity" (within the framework of the University's "Week of Tolerance"), "Youth Solidarity Day", "Defender of the Motherland Day", "History and modern times", "Russian traditions", "Years scorched by war", etc.; participation in the conduct of the All-Russian Open Lesson "Day of Unity of Action for the Education of Children and Youth against HIV / AIDS"; charity event on the Day of Child Protection, etc.

Also, many curators of academic groups of the faculty work closely with the history museum of the faculty, which provides significant assistance in solving the problem of civil and patriotic education of future teachers. Great importance in the formation of the future teachers' citizenship and patriotism is played by the out-of-class creative activity of students. At the same time, the following forms of work are used: "Museum Thursday", "Museum lounge", Club of interesting meetings with the participation of the graduates of the faculty "My destiny in the fate of the native land", Round table with acute angles on problems of civil and patriotic education of modern youth. Also the formation of citizenship and patriotism among students takes place through the organization of survey and thematic excursions on the themes: "History of the formation and development of the faculty", "Traditions of the faculty", "Our faculty in the years of the Great Patriotic War", "Faculty members", "History of the development of the education system Chelyabinsk region", etc.

An important role in the formation of civil and patriotic qualities of the student's personality is assigned to meetings with veterans of the war, workers of the rear and children of the war. Also, as part of the celebration of Victory Day, the museum holds the following traditional events: Lessons of Memory "Nobody Is Forgotten, Nothing Is Forgotten", projects-presentations "By Memory Pages", creative evenings "On the Roads of War", etc. At such meetings and events, future teachers not only learn about many interesting facts of the difficult war period of our country from eyewitnesses of these

events, but also review their position in relation to the profession they receive, to the past and present of the South Ural land, to the future of their country.

Interesting museum forms of work aimed at nurturing citizenship and patriotism are such various contests as "The History of My Family in the Years of the Great Patriotic War", "The Pedigree of My Family", "Leafing the Pages of My Homeland", "While Memory is Alive in Our Hearts, Russia is Still alive"; photo contests; video contests dedicated to the history of the university and faculty, as well as the city of Chelyabinsk.

As a result, we emphasize that today many hypotheses are practically confirmed and exhaustive answers are given to actual questions of professional training of the future teacher [2].

To sum up, the activities of the curator are one of the important components of professional and pedagogical education, including in terms of civic-patriotic education of future teachers. Moreover, the role of the curator in the civic-patriotic education of students is significant, since the possession of such qualities as citizenship and patriotism will help future teachers to adequately educate the younger generation, be ready to carry out civic-patriotic education in an educational institution and to interact actively in the modern conditions of the Russian democratic society.

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**PRAGMATIC CHARACTERISTICS OF ECOLOGICAL
ACADEMIC DISCOURSE**

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Abstract: The article considers the problem of discourse markers from national-cultural medium aspect. Qualitative and quantitative analysis of discourse markers in environmental research papers has been carried out.

Key words: discourse markers, academic discourse, national-cultural medium.

Academic discourse has been the focus of various pragmatic studies and is usually considered to have a number of universal characteristics, such as consistency, objectivity, etc. Many researchers have discussed academic discourse from a pedagogical point of view aiming at formulating clear instructions for students [1, 2, 3]. The second major aspect of research is professional communication among experts evaluating the impact of the native language writing culture as well as the disciplinary culture by which the researcher is socialized into academic studies [4]. Numerous studies describe different approaches to establishing the identity of an academic writer [2, 3, 5, 6, 7]

There are certain organizational differences in terms of discourse, including ones caused by national specifics. In this respect, it is particularly interesting to compare the specifics of the use of discourse markers as one of the main means of scientific discourse organization.

The purpose of this study was to conduct comparative research of discourse markers in scientific articles in English and Russian. The study was conducted on a small corpus of 10 scientific articles on ecology in English and Russian. The subject of the study was to

identify the national specifics of the use of discourse markers for the organization of scientific texts in English and Russian.

In total, we analysed five articles on ecology in Russian published in scientific journals recommended by HAC of the Russian Federation as well as five articles in English from the peer-reviewed online journal Environmental Sciences Europe. We have analysed the content of the articles by continuous sampling and made a complete list of discourse markers used by the authors. The total number of discourse markers was 86 tokens for the Russian articles and 153 tokens for the English articles. A further percentage was calculated for each group of markers, and the results of the calculations are shown in Table 1.

Table 1		
Category of DM	Articles in Russian (%)	Articles in English (%)
Sequence of information	12.8	6.5
Page arrangement	1.2	19
Presentation of new and additional information	26.7	20.2
Repetition of information	1.2	3.3
Emphasizing the importance of information	3.5	2
Opposition, digression from the main subject	9.3	15
Introduction of examples	13.9	9.8
Conclusion	2.3	12.5
Evaluation of authorial modality	16.3	7.9
Reference to the source of information	12.8	3.8

According to the results of our research, the largest group of DM in both the Russian and English articles is that responsible for the presentation of new information, including *к вышесказанному можно добавить, вместе с тем, а также, а further assumption, additionally as well as u m.n.* The main functions of a scientific text are the preservation, development and transfer of scientific knowledge, so this group of markers is responsible for implementing the scientific discursive function.

The second frequency band in the Russian articles is the DM expressing the authorial modality: *к сожалению, видимо, возможно, etc.* This

makes the presentation more emotional. English articles demonstrated fewer DM of this category; such DM as *assuming*, *generally* and *ideally* account for only 7.8% of the total.

The English articles of the second frequency band are allocated for the DM responsible for page arrangement. Notably, the visibility function (*Table 1*, *Chart 2*) occurs much more frequently than do explicit references to tables and figures (*Table 1*). Such DM are responsible for implementing the visibility function and help facilitate the understanding of the target text. It is noteworthy that the number of markers in similar Russian articles is extremely small. However, it is difficult to derive global conclusions from such a small sample group; the problem of the use of this category of DM requires further investigation on a more extensive corpus.

The third place for the Russian articles is the group of DM responsible for the introduction of examples. Factual information is introduced by means of DM such as *в частности*, *например* and *так*. For the English articles, this group ranks fifth in frequency of occurrence and is represented by such DM as *for example*, *for instance* and *another finding is*.

The group of DM that indicate the sequence of information, for example, *в первую очередь*, *второй аспект*, *с одной стороны*, *с другой стороны*, *first*, *following this*, *the second benefit*, etc. is ranked fourth in the Russian articles and seventh in the English articles. This is probably due to the fact that the structure of English articles is realized by means of a standard set of sub-headings to help the reader navigate the logic of the material while the Russian articles are arranged only by means of discursive resources.

This is followed by a group of DM, which indicate the source of information, for example, *по данным (имя)*, *по данным (организация)*, *согласно исследованиям*, *according to*, *many authors show*, *other researchers have found*, etc. In the Russian articles, such markers are used more often than in the English articles, 12%, 8% and 3.8% respectively.

The low-frequency groups in the Russian articles include DM responsible for emphasizing the importance of information, conclusion, page arrangement and the repetition of information. These results suggest that the Russian-speaking authors hardly ever translate their mental operations to the reader, providing readers an opportunity to evaluate the logic of the research on their own.

The low-frequency groups in the English articles are DM responsible for the presentation of new or additional information and those emphasizing the importance of information as well as digression from the main subject. Perhaps this is due to the desire of authors to provide the reader only with the relevant information and, as in the case of the Russian articles, provide an opportunity to assess its significance. As a result of this research, certain differences in the use of discourse markers in scientific articles in English and Russian have been revealed. These differences can be explained by the cultural identity of the function of the scientific discourse as well as by the choice of communicative strategies by the researcher. It seems promising to study this issue further on a more extensive corpus.

Conclusion. According to the results of the present study the problem of discourse markers is of particular interest when considered through the prism of natural-cultural medium. Blended format of the research combining qualitative and quantitative methodology fosters powerful insights into national and cultural differences of native and non-native academic discourse. Despite a few interesting findings it should be noted that the corpus we compiled for consideration is rather small and this should be considered the beginning of a major study aiming at critical analysis of larger corpora of native and non-native academic discourse. This would allow less questionable and more precise results for all the findings mentioned in the current research. However, it is true that there exist national and cultural differences of academic discourse which should be considered not only as a part of fundamental linguistic research, but also as a part of ESP curriculum. Integration of Russian researchers into the international scientific community should be promoted by provision of solid recommendations on the best ways of presenting their results in English.

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**WHAT FOR DO WE LEARN THE FOREIGN LANGUAGES, OR
WHY DO WE ALWAYS HAVE PROBLEMS WITHIN CROSS-
CULTURAL COMMUNICATION?**

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Abstract: The plenary lecture (the brief) addressed to the Russian students who study different foreign languages gives impetus to them for their critical/reflective thinking over the cultural diversity and the complicated problems which appear when the cross-cultural communication begins. The concrete recommendations are neither considered nor prioritized, it is impossible to give the utter solutions but to enforce the students to speculate about the topic is an effort to move forward.

Key words: the cultural diversity, ‘polychronic’ and ‘monochronic’ time, ‘high- and low-context culture’, Ed. T. Hall, G. Hofstede, R. Lewis.

National culture cannot be changed, but you should understand and respect it.
G. Hofstede

Since the time the cross-cultural communication theory appeared asking this question (see the title) has not stopped, yet it has grown stronger all the time. But we have been asking the rhetorical question. The answer on the first part of the question is easy. We do it for communicating (orally or in a written form) with the representatives of

other cultures. The answer on the second one is not so evident. We may choose the exhaustive answer as an ultimate destination: we, obtaining our own cultural code, will never understand the alien. Keeping it in mind we can do the only rational thing, we can speculate about it. The framework of the conference plenary lecture and the absence of Cross-Cultural Communication course in the syllabus as well give us a room for it. We don't come to the final outcomes, but we induce our logical thinking for our better comprehension of the reasons of this sort of misunderstanding. And the classical theories (authors) will be our companions.

Let's start from the prominent American cross-cultural researcher Ed. T. Hall. He is considered a founding father of intercultural communication as an academic area of study. The important sources for us are "The Silent Language" (1959), "The Hidden Dimension" (1966), "Beyond Culture" (1979). What was innovative about Hall's work [1] is that instead of focusing on a single culture at a time (typical in 1950's anthropology), he responded to the practical needs of his students at the Foreign Service Institute to help them understand interactions between members of different cultures.

Throughout his career, E. Hall introduced new concepts, including 'polychronic' and 'monochronic' time, and 'high- and low-context culture'. In "The Hidden Dimension", he describes the culturally specific temporal dimensions that surround each of us. In "The Silent Language", he coined the term 'polychronic' to describe the ability to attend to multiple events simultaneously, as opposed to 'monochronic' individuals (cultures) who tend to handle events sequentially [2]. Polychronic cultures are much less focused on the preciseness of accounting for each and every moment; they are more focused on tradition and relationships rather than on tasks (a clear difference from their monochronic counterparts), rather than watching the clock. Polychronic societies have no problem being late for an appointment if they are deeply focused on some work, the concept of time is fluid. As a result, polychronic cultures have a much less formal perception of time.

According to E.T. Hall ("Beyond Culture"), messages exchanged in a high-context culture (China, Japan, other Oriental cultures) carry implicit meanings with more information than the actually spoken parts, while in low-context cultures (USA, European countries), the

messages have a clear meaning, with nothing implied beyond the words used [3].

Starting from E.T. Hall, let's go on to one more expert Richard Lewis (UK), who is the direct follower of the Dutch cross-cultural psychologist, a pioneer in his research of cross-cultural groups who played a major role in developing a systematic framework for differentiating national cultures and organizational ones, Geert Hofstede. He is known for his books "Culture's Consequences" and "Cultures and Organizations: Software of the Mind" [4], co-authored with his son.

Richard Lewis is a linguist who speaks 12 languages, his "When Cultures Collide: Leading across Cultures" (1996) provides a guide to communicating across cultures, and explains how your culture and language affect the ways in which you think [5]. He is known for his "Lewis Model of Cross-Cultural Communication." The core of it classifies cultural norms into Linear-Active/Multi-Active/Re-Active, or some combination. Northern Europe, North America are Linear-Active, following tasks sequentially using Platonic logic. Southern European, Latin, African and Middle-Eastern countries are typified as Multi-Active, centered on relationships and often pursuing multiple goals simultaneously. East Asia is typically Re-Active, following solidarity-based strategies. While Lewis' writings recognize these can only be stereotypes, he asserts that his model provides a practical framework for communicating with people of other cultures, and that the model can readily be expanded with other features, such as Hofstede's cultural dimensions, seen in relation to Lewis' triangular representation.

This is a list of only 3 names of cross-cultural theoreticians (we didn't mention F. Trompenaars), but it is enough for us to understand that we can achieve a good understanding of our foreign counterparts only if we realize that our 'cultural glasses' are coloring our view of them. We need to examine the special features of our own culture. "Our task, once we realize that we, too, are a trifle strange, is to understand the subjective nature of our ethnic or national values." [5: 22].

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**LINGUISTIC MEANS OF THE “SUPERNATURAL”
 CONCEPT’S EXPRESSION
 IN BRITISH LITERATURE OF THE VICTORIAN EPOCH AND
 THEIR TRANSLATION INTO RUSSIAN**

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Abstract: The article is devoted to the problem of cross-lingual transferring of the “supernatural” concept from English into Russian. The material of the research is based on works of British authors of the Victorian epoch and their translations into Russian. The article reflects the basic methods of the original lexical units and word combinations translating from English into Russian.

Key words: supernatural, translation, British literature, the Victorian epoch, translation techniques

Introduction. Stories about spirits and ghosts were especially widespread in the media with the publication of Charles Dickens's classic novel “A Christmas Carol in prose” in 1843 and the belief in ghosts and otherworldly forces was further strengthened in public consciousness.

Methodology. In describing the face of Marley’s ghost, who appeared in front of Scrooge, the author uses the expression “... *had a dismal light about it ...*” [17]. The translation variant by bar. S.A. Wrangel (1909): «...*распространяло вокруг себя слабый свет...*» (*the otherworldly connotation of the original word combination is weakly expressed in Russian version*) [2].

The translation variant by N. Pusheshnikov (1912): «...окруженное зловещим сіяніем...» (*the otherworldly connotation* of the original word combination in Russian version is more specific, however, there is some distortion of the meaning - the translator uses the lexical substitution technique, adding a different meaning to the translated text) [4].

The translation variant by T.A. Ozerskaya (1959): «...излучало **призрачный свет...**» (*the otherworldly connotation* of the original word combination in Russian version is true, no distortion of the original value is observed) [3].

Another word combination with the “supernatural” component in the text of the story - *haunted houses/дома с привидениями*. An example from the authentic text of the story: “*Scrooge then remembered to have heard that ghosts in haunted houses were described as dragging chains*” [17].

The translation variant by bar. S.A. Wrangell: «Скрудзь вспомнил рассказы о томъ, что **появляющіяся въ домахъ привидѣнія** обыкновенно влачатъ за собою цѣпи» [2]. The translator uses the admission method, somewhat distorting the original meaning. It should be noted that *haunted houses*, based on the semantics of the authentic phrase are already a priori populated with ghosts, which are constantly living in them, and don't appear from time to time.

The translation variant by N. Pusheshnikov: «Скрудзь тотчасъ же припомнилъ тѣ рассказы, въ которыхъ говорилось, что **въ тѣхъ домахъ, гдѣ водится нечистая сила**, появленію духовъ сопутствуетъ лязгъ влекомыхъ цѣпей» - the translator uses a complex transformation (addition and lexical substitution) [4]. It should be said that one of the tasks of a translator is the preservation of the national and cultural color of a foreign language when it is reproduced in the language of translation, which N. Pusheshnikov failed to do - the word combination «*нечистая сила*» is more close to the characteristic of Russian linguistic culture. However, this interpretation emphasizes the constant presence of *supernatural phenomena* in a *haunted house*.

The translation variant by T.A. Ozerskaya: «Невольно Скруджу припомнились рассказы о том, что, когда **в домахъ появляются привидения**, они обычно влачат за собой цѣпи» - this interpretation is similar to the translation by bar. S.A. Wrangel [3].

In general, it should be noted that the Russian version by T.A. Ozerskaya (1959) might be considered as the most adequate, while comparing it with pre-revolutionary translations and we come to the conclusion that they sometimes allow "depletion" and incorrect cross-lingual transferring of the author's intentions by omitting some lexical units, as well as non-observance of preserving the national and cultural color principal, that is not permissible.

A. Conan Doyle also addressed to the mystical topic in his work. A special place among writer's works is occupied by his mystical stories, the plotline of which closely intertwines reality and mysticism in a single narrative.

In the authentic text of the story "*The Terror of the Blue John Gap*", a lexical unit with the "supernatural" component is found in the nomination of a strange and bloodthirsty creature who abducts sheep during moonless nights – "... *the Terror that lives in the Blue John Cave*" [16].

The translation variant by V. K. Stengel (1964): «...*Страшилище, которое живет тут, в пещере Голубого Джона*» [11]. The translator uses the lexical replacement technique, selecting the most equivalent lexical unit, based on the context of the work.

In the story "The Silver Mirror" we can select constructions *opacity ... appeared to slowly rotate this way and that/дымка, казалось, медленно вращавшаяся то в одну, то в другую сторону* and *a thick white cloud swirling in heavy wreaths/густое белое облако, свивавшееся тяжёлыми клубами*: "*This opacity, when I stared hard at it, appeared to slowly rotate this way and that, until it was a thick white cloud swirling in heavy wreaths*" [15].

The translation variant by V. S. Kulagina-Yartseva (1995): «...*зыбка дымка медленно вращалась то в одну, то в другую сторону, затем сгустилась в белое клубящееся облако*» [10]. The translator uses a complex transformation:

1. addition + omission - the author of the translation adds a descriptive characteristic in the form of a lexical unit *зыбка*, and the lexeme *appeared/казалось* is to be omitted in this interpretation, which indicates the translator's desire to emphasize the "reality" of what is happening;

2. lexical substitution + omission - the translator replaces the lexical unit *was/стала* with a lexeme *сгустилась*. The lexical unit *thick/густой* is omitted by the generalization method (according to Barkhudarov) - in Russian version *клубящееся облако* (less concrete meaning) [1].

In the authentic text of the story "The American's Tale" we meet the following phrase with the "supernatural" component – "*The great thorns had been slowly driven through his heart ...*" [14]. The translation variant by VA. Mikhalyuk is interpreted as follows: «...*огромные шипы медленно пронзили его сердце*» [9]. It was noted that this variant of cross-lingual transferring is absolutely right.

It should be said that W. Collins also touches mystical topics in his works. In the author's novel "The Haunted Hotel" we can develop a very realistic description of *otherworldly phenomena* [5].

First of all, the lexeme with the "supernatural" component is already found in the title of the novel - *haunted/населённый призраками*. In Russian linguistics, the first linguist, who began the theoretical interpretation of the title, was A.M. Peshkovsky, who correctly established the basic status of the title, as is to be something more than the usual name of the work, but concealed some other internal essence, hidden from us, which remains until a certain time, as it were, a "thing in itself" for the future reader [12].

The translation variant by VA. Kharitonov is a kind of direct interpretation of the title into Russian - *The Haunted Hotel/ Омель с привидениями*. The presence of verbatim elements in translation is due to the number of objective reasons; the main one is the presence of a semantic parallelism of languages, resulting from the existence of linguistic universals [8]. To such kind of universals it is possible to refer a "supernatural" concept. Referring to the theory of equivalence levels by V.N. Komissarov, we note that this example can be attributed to the first, the highest type of equivalence - the level of linguistic signs (words). The lexical unit *ghost* is carried in itself an *otherworldly connotation*, which in Russian version produces an impression of the intrigue on the reader, a mystery of the subsequent narrative.

A vivid example of the phrase with the "supernatural" component we can find in the lines that tell of Mrs. Norbury's dreams in room No. 14 of the Venetian hotel: "... *she saw him as a tempted shadow creature to drink and die from poisonous sediment ...*" [13].

V.A. Kharitonov suggests the following translation: «...то какая-то **призрачная фигура** соблазняла его глотком воды, и он умирал от яда...» [7]. The lexeme *shadowy* has its Russian equivalent - the lexical unit *призрачный*; it must be recognized that the translator was able to accurately convey the *otherworldly connotation*. It should also be noted that the lexical unit *creature* in Russian is translated by the same lexical unit - *существо*, the semantics of which means a sign of something alive that exists in reality. In this regard V.A. Kharitonov selects the most suitable lexical unit, a semantically neutral *фигура* that does not have any indication of a sign of something alive, from which it can be concluded that the connotative meaning of the original lexeme in Russian version is correctly conveyed. This example, according to the theory of V.N. Komissarov, can be attributed to the third type of equivalence - to the level of the message/text. In our opinion, W. Collins in the authentic text of the novel leads exactly to the lexeme *creature* in order to give liveliness and clarity to the narrative. The difficulty of cross-lingual transferring of connotation is overcome by selecting a way of translation that is the closest to the sense of an authentic lexeme, even if it involves replacing the original lexical unit by the lexical unit of the translation language, the semantics of which is strikingly different from the authentic one.

Mystical stories occupy a special place among works of R. Kipling, and their mysterious atmosphere takes the reader into the realities of the other world. The “supernatural” component is already found in the name of one of his stories – “*The Phantom’ Rickshaw*” – «*Рикша-призрак*». It should be noted that *the phantom* is the lexical unit for the designation of *ghosts* in English and is used less often than *a ghost* itself.

“*He has, of course, the right to speak authoritatively, and he laughs at my theory that at the head of Pansei there is a crack, and the Little Dark World appeared and betrayed him to death*” [18]. The word combination “*Dark World*” in Russian can be translated literally – «*Тёмный мир*». A.M. Shadrin suggests the following translation: «*Разумеется, у него есть право утверждать это безапелляционно, и он просто-напросто смеется над моей теорией, что у Пэнси в голове была щель, через которую туда проникла нечистая сила, и что она-то и прикончила его*» [6].

The word combination *нечистая сила* is not an accurate cross-lingual transferring of the nationality and cultural color, because the translator does not observe this principle in his way of interpretation. This phrase is more typical for the color of Russian works, for example, Russian folk tales and novels by N.V. Gogol.

. **In conclusion.** We emphasize that in order to achieve the completeness of cross-lingual transferring of the source text's connotations translators use a complex of transformations that help them to interpret author's intentions in the best way.

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PSYCHOLINGUISTIC PHASES OF AN ACADEMIC DISCOURSE INTERPRETING

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Abstract: The aim of the study is to reveal the role of psycholinguistic phases while creating the interpreting of an academic public discourse. Scientific relevance of the research consists in a new approach to a public speaking investigation.

Keywords: academic monologue, discourse, linguistics, psycholinguistic phases, public speaking

Introduction. The purpose of the research was to find out the importance of the psycholinguistic phases when composing an academic public discourse interpreting. The analysis was carried out on the case studies of the academic public orations delivered in the Modern English period.

The most important task of translation theory is to identify linguistic and extra-linguistic factors that make it possible not only to achieve full identity, but the content identification of the statements in the foreign and translated languages. It is necessary to strive for the highest possible identity degree realization especially in the simultaneous interpreting.

The main difference of simultaneous interpreting from the other translation types is the parallelism of orator's speech perception and speech production into translated language [1]. In order to reflect the text content in the translation, providing the most accurate original format in a different linguistic code, the interpreter must know by intuition those typological general laws, which are wider than the laws inherent in each language in its division on vocabulary, grammar and phonetics [2].

Results and discussion. The special attention in the article is drawn to the linguistic and psychological phases comprising the steps in the course of interpreter's activities. Every action consists of orientation, implementation and monitoring phases. Each phase has its own characteristics; moreover, the phases are not strictly sequential, superimposed on each other [3]. Before the interpreter gets onto direct activities, it is necessary to be prepared for it and genre or stylistic peculiarities of the speech translation largely determine the arrangement specificity.

A public academic monologue differs from the scientific speaking so as it aims at the audience, even though often optionally unprepared. A skilled public academic speaking is characterized by clarity and accessibility of the thought development, a moderate usage of terms, a good literary language and a general emotional mood of the oratory, which will involve the audience in the process.

During the interpretation process an orientation phase should be the first, it is extremely important in order to achieve identity in the translation of an academic public oration. This phase involves the orientation in terms of translation tasks, without which the achievement

in the direct translation is impossible. The translator has some original idea of what the speaker is saying, has a vocabulary of terms and keywords, but the prediction may be wrong. The elements of the incorrect prediction of the interpreter are shown in the following speech translation: «This is actually my first time in Russia ... in Moscow», «I know ... I do not know how familiar you are ...» («*Я вообще впервые в Рос... в Москве*», «*Я знаю... не знаю, насколько вы знакомы...*») by Mark Zuckerberg (2012) [4]. In the first case, the prediction error is visible, but it is not significant – even if it took place in the spoken text, passage meaning would not be greatly distorted. In the second case the error would completely change the meaning of the passage, but the interpreter immediately corrected it. There were case studies where the prediction was correct, but the translator said not only the first – the right option, but also the second which was wrong. In the same speaking: «Sometimes I visit ... I pass some country» («*Иногда я приезжаю... проезжаю какую-то страну*»). The first phase ends with a decision [3].

The second phase of action, which is called an implementation phase, is that the interpreter completes the generation of the text passage in the target language in concordance with the taken decision. According to E. V. Parshin, «During the second phase the translator deploys the external utterance utterances in the target language, designed or selected from a range of prepared ones during the first phase of action» [5]. In some videos from www.youtube.com, which provide simultaneous interpreting it can be noted that in the course of the translation the interpreter often uses set expressions as a lip-labour: «For a couple of days» («*На пару дней*»), « It will be a particular honor to me...» («*Для меня особенная честь...*»). There are cases where oral speaking may be incorrect in terms of language structure, since an interpreter can mix several possible structures: «Who is the next to need ... will be able to use it» («*Кто следующий пон... сможет пользоваться этим*»). There is obviously synonymous mixed construction «who needs» («*кому понадобится*») and «who will be able to use» («*кто сможет пользоваться*»). The translator chose the second option, but the first elements appeared in the translation as well.

The initial phases are characterized by the transience of being, while the third phase – a monitoring phase – can be stretched in time. During this phase, the interpreter evaluates how adequate those

decisions were. Extended time of the third phase is due to the fact that the translator can ensure of the correct solution often only after a few speaker's statements. Sometimes, as in a case of the Zuckerberg's speaking interpretation, the translator can comprehend that the original decision was wrong or imprecise and amend: «Sometimes I visit with some kind of mission <...> an important country» («Иногда я приезжаю с какой-то миссией в страну <...> в важную страну»). Marking of «an important country» («важную страну») allows strengthening the identity of the translation, as it clarifies the idea that originally was not transmitted on the full extent. Prearrangement permits making more correct prediction.

Conclusion. Summing up it is necessary to point out that while interpreting an academic discourse the stylistic peculiarity of this speech type that combines the features of scientific and publicistic styles must be considered. In the translation implementation the first phase provides an opportunity: 1) to judge how accurate the predicted statements were; 2) to make the necessary adjustments and create a statement in the target language, which is pronounced in the second phase. The third phase aims at evaluating the correctness of the taken decisions in the broader context

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NEW TRENDS IN ENTREPRENEURSHIP AS THE SINO-
RUSSIAN ENTREPRENEURS' "HONEYMOON"

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Abstract: Not only the long history of Sino-Russian economic communication but also Good timing, geographical convenience and good human relations help build up a solid foundation for modern cooperation between China and Russia as well as provide entrepreneurs with good opportunities to process global operation in Russian market or Chinese market. We regard such good relationships between China and Russia as "honeymoon". This paper explores some new trends in entrepreneurship, which are both in China and Russia and pinpoint the underlying reasons behind those new trends. Under "honeymoon", it is believed that Chinese and Russian entrepreneurs should seize the opportunity, expanding cross-border e-commerce communication, promoting technical exchange, and creating a win-win situation for both Chinese and Russian.

Key words: China, Russia, Entrepreneurship.

Background Information. Speaking of Sino-Russian relations, the two countries are each other's largest neighbors. The friendly relations between China and Russia can be traced back to the former Soviet Union. In 1949, the Soviet Union was the first country in the world to establish diplomatic relations with People's Republic of China. In 1991, after the disintegration of the Soviet Union, Russia inherited the diplomatic relations between the Soviet Union and China. At the beginning of the new century, the leaders of two sides signed the "The Treaty of Good-Neighborliness and Friendly Cooperation Between the People's Republic of China and the Russian Federation", a twenty-year strategic treaty. This is a milestone document for the development of Sino-Russian relations as it laid a solid legal foundation for long-term good-neighborly friendship and mutually beneficial

cooperation between the two countries [1]. Furthermore, China has established “Comprehensive Strategic Partnership of Coordination” with Russia. Also, both countries stay close coordination in some international framework such as G20, BRICS, SCO and APEC. China and Russia are good partners, good friends and good neighbors which provides a fair, harmonious and safe political environment for bilateral trade. China and Russia not only have a friendly relationship on the political front but also a mutually beneficial cooperation in economy and trade. As an important part of the “Comprehensive Strategic Partnership of Coordination”, the economic and trade cooperation between the two countries has been deepening during these years.

The Sino-Russian import and export trade volume maintains double-digit growth and has reached \$69.5 billion in 2016. At present, the promotion of the cooperation of large projects in the fields of finance, energy, nuclear energy, aviation, aerospace, science and technology, transportation and communication lead to flourishing of local economic and trade cooperation. In the future, the two countries will continue to broaden the areas of cooperation and become increasingly active in mutual investment. China has become Russia’s largest trading partner for six consecutive years from 2011 to 2016. Total direct investment from China to Russian non-financial sector has reached \$4.42 billion and average annual growth of more than 40% in the past 10 years [2].

When President Putin came to power in 2000, the national economic development strategy was brought on the agenda. Investment policies conducive to investment were introduced, which has actively promoted Sino-Russian economic and trade cooperation. Regular meeting mechanism between Chinese and Russian Prime Ministers is built up to maintain and gradually normalize high level development of Sino-China pragmatic cooperation.

On the other hand, in 2015, China has initiated the “One Belt, One Road” development strategic framework, which respectively stands for “The Silk Road Economic Belt” and “The 21st-century Maritime Silk Road”, to rekindle and boost the connection and cooperation between countries included. Under this great initiative, countries could communicate economic development strategy and countermeasure to each other so as to eliminate trade barriers, reduce trade and investment costs, and improve regional economic cycle speed

and quality. Furthermore, cross-border transport infrastructure will be constructed to facilitate the countries' economic development and personnel exchanges. Russia as a significant node in this framework will benefit from it. Due to economic sanctions imposed by US and European countries in 2015, the ruble has devalued dramatically. But in the recent two years, the ruble exchange rate has gradually stabilized recently and has risen slowly. This will undoubtedly regain trust of investors in the future. According to the above analysis, the macro-environment for Sino-Russia trade development is in a relatively ideal situation, which lays a substantial and fertile soil for entrepreneurs to display their innovation, creativity and entrepreneurialism and realize their career goals.

Chinese Entrepreneurs in Russia. Sino-Russian economic and trade relations, business cooperation has been strengthening. Since 2010, China has been Russia's largest trading country for six years. Recently, Sino-Russian trade has entered the "structural adjustment period" from the "rapid growth period". Development of economic and trade cooperation is insufficient, but bilateral trade still has a good foundation and great potential for cooperation, and needs to be generated on cultivating and excavating new growth points of bilateral trade. Many economic factors boom in this stage: Sino-Russian cross-border e-commerce potential is enormous, innovation field coincidentally become the common ground of Sino-Russian Economic development. Both of China and Russia actively invest in cooperation to promote trade growth. Based on this reality, how can Chinese entrepreneurs actively seize the opportunity, enter the Russian market, and help promote a win-win situation for both China and Russia?

First, seize the huge potential of the e-commerce market. Data from Russian Electric Business association shows the first half of 2016, the Russian electricity market size up to 405 billion rubles (about \$6.3 billion), grew by 26% compared with last year. To be detailed, 143.1 billion rubles (about \$2.2 billion) for cross-border electricity trade, a year-on-36%, accounted 35% of the total Russian trade [3]. The association expects that the Russian electricity market will reach 900 billion rubles (about \$14.1 billion) in 2016, and 18.4% increase in the year. Nowadays, Russia has two major Chinese electric business platform – *JingDong and Alibaba* fast-selling. Half of Russia's cross-border electric business undergoes with China. Since 2011, Russia's

cross-border electronic business turnover has been increasing, and as forecast, end in 2016, Sino-Russian cross-border electricity trading volume can reach \$2.5 billion [4]. Besides, Russia also actively encourages Chinese brands to enter into Russian market through the e-commerce. In 2016, the largest Eastern European e-commerce expo was held at the Moscow Exhibition Centre. Rufavor (as the ECOM Organizing committee OBOROT, Russia's largest e-commerce Portal) designated China as exclusive joint organizers, performing Sino-Russian Trade ambassador identity [5]. Jack Ma, founder of Alibaba Group, Chairman of the Board of directors attended the St. Petersburg International Economic Forum, and published a lecture on the topic from information technology to data technology: A new era of commerce and trade, he said Russian market has enormous potential in Europe and “Fast Selling” has become the most popular web site in Russia in the last three years. Alibaba processes rapid development by the virtue of the enormous market share in the Russian market. Chinese entrepreneurs should also rely on reference to supplement other marginal markets, and improve China’s electricity market in Russia net.

Second, Sino-Russian economic Development focuses on the construction of innovation. It will also be a chance for Chinese entrepreneurs to open the Russian market. In 2014, Russian President Vladimir Putin announced that Russia began implementing national technology innovation strategy. In 2016, the CPC Central Committee and the State Council issued the “National Innovation-driven Development strategy” [6]. October 2014, China and Russia signed a memorandum of cooperation on the development and construction of the Sino-Russian Silk Road Hi-Tech Industrial park, “Sino-Russian Silk Road innovation and entrepreneurship plan and US pace project”, which all provides fundamental support and encouragement for Chinese entrepreneurs to set up emerging industry. Entrepreneurs can take this as the benchmark, grasp the overall cognition of trade structure, focus on the basic situation of Sino-Russian trade, conduct product industry analysis, chose the most powerful breakthrough point. The theme of Russia's sixth Innovation industry exhibition *Made in China* is a good example. Exhibitors of Chinese enterprises are 133 in total, including high-speed rail, aerospace, aviation, ships, electric power, automobiles, electronics, machinery, nuclear energy, satellite navigation and other 10 plates. Eg.: the latest standard high-speed railway EMU model CRH

and the alpine wind-resistant sand train model; the independent design of the C919 large aircraft, ARJ-21 feeder aircraft, the space Technology of Chang No. 3 detector [7]. All of them have made a benchmark model for Chinese entrepreneurs in the field of innovation.

Last, Chinese entrepreneurs' R&D are required to be based on Russian economic situation and bilateral trade structure. For example, Russia has an absolute competitive advantage in energy, but is slightly thinner in light industry development. Therefore, Chinese entrepreneurs need to consider the structure of export products, as well as the high inflation of Russia, and the current situation of declining disposable income in Russia. More practical export product at a relatively low price is preferable, compared with expensive luxuries.

In short, under the background of the growing era of e-commerce trade, Chinese entrepreneurs should seize the enormous development potential of e-commerce, combine innovative product demand, optimize export structure, clarify product positioning, and strive to open up Russian market, promote good trade cooperation and economic exchanges between the two countries.

Russian Entrepreneurs in China.

One of our friends who have settled in Jixi for a long time told us that, "Every day I can see a lot of Russians. They are beautiful, generous and strong, and they have the features that are generally owned by the Russians. They are shouting at the top of their voice to attract the attention of the people to do their businesses even though the weather is cold. We communicate with each other, we buy each other's goods. The interesting thing is that in Manchuria, a city of Inner Mongolia, you will see a large group of Russians, who have never met before, have swung from the opposite of the river. It's really surprising and funny."

From our friend's story, we can see that today's Sino-Russian relations are developing soundly. We regard this period as honeymoon. Under this background, there will be some new changes about the fact that Russians start up business in China. We can predict that on the one hand, there will be fewer barriers and more opportunities to Russian entrepreneurship in China. On the other hand, inevitably there exist some challenges.

For the Russian entrepreneurs in China, today is an essential opportunity. As an old Chinese proverb goes: "Good timing,

geographical convenience and good human relations.” We start from good timing. China and Russia maintain close cooperation in many aspects such as politics, military, natural resources and so on. Under the strong oppression from the United States, Sino-Russian relations are heating up, which is like China and the Soviet Union's friendly diplomatic relations during Cold War. Under the strong influence of political factors, the Sino-Russian relations seem indestructible. Secondly, as college students, we have been able to deeply feel the power of Mass entrepreneurship and innovation in the campus. Mass entrepreneurship and innovation is a new policy in China, which aims to improve the employment environment and strengthen innovative power. China is strongly supporting innovation and entrepreneurship, and in this context, the Russian entrepreneurs will enjoy the Chinese government's various welfares.

Now we come to geographical convenience. China and Russia have the geographical advantage which other countries are difficult to surpass. On October 20th, 2016, “Russian entrepreneurial street” was opened in the Sino-Russian border Suifen River (Razdolnaya) and many Russian entrepreneurs stationed here [8]. “Russian entrepreneurial street” is the first business street, which concentrates on serving the Russian businessmen in Chinese history. This business street aims to provide a good platform for entrepreneurship in China. In the street, the Russians reap many benefits from Chinese government, such as free rent for two years, assisting in handling business license and so on, which greatly improved the confidence of the Russians to start their own business in China, but also help more and more Russians to complete the dream of entrepreneurship.

The last but not the least, we begin to discuss good human relations. Since we have studied in Moscow, we can deeply feel the friendly relations between the two peoples. In the streets of Albert Street, we can see Chinese tourists everywhere. In Suzdal town, the seller of honey wine can easily speak fluent Chinese. In Moscow, there are several Chinese markets. And in China, Russian drama such as «Как я стал русским» and «Екатерина II Алексеевна» become more and more popular among university students; Chinese regard Russian as fighting nation which is intrepid and lionhearted; President Putin has become a lot of Chinese people's idol. In 2015, China Fengdong town implemented “USpace remote incubator” project. At the same time,

Russia has also established a “Startup” platform. Through the combination of USpace and Startup projects, young people from China and Russia are supported to innovation and entrepreneurship and the youth on both sides can have deep communication with each other.

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*Xiaopeng Chen*¹, *Chenkai Jiang*²
**THE CULTURAL IMPACTS ON INTERNATIONAL TRADE
BETWEEN CHINA AND RUSSIA**

China

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Abstract: The material studies the current situation in Sino-Russian trade. Different aspects such as cultural diversity (language, cultural codes, etc.) are analyzed. The ways for the adequate cooperation are presented.

Key words: Sino-Russian trade, import and export commodity, economic cooperation.

1. A Study on the Current Situation of Sino-Russian Trade.

1.1. From the perspective of trade volume

The annual trade volume between China and Russia was in overall upward trend from 2008 to 2014. Only in 2009, due to the 2008 financial crisis, the Sino-Russian trade volume dropped significantly. In this period, the trade balance between China and Russia is generally fluctuating.

Table 1. Trade volume between China and Russia from 2008 to 2014 (billion)

Year Import vol. Export vol. Total vol. Trade bal. Growth (%)

2008	23.83	33.07	56.91	9.24	-
2009	21.23	17.51	38.75	-3.72	-31.9
2010	25.92	29.61	55.53	3.69	43.3
2011	40.36	38.90	79.27	-1.46	42.7
2012	44.13	44.05	88.19	-0.08	11.2
2013	39.66	49.59	89.25	9.93	1.2
2014	41.60	53.68	95.28	12.08	6.7

Source: [1]

At present, China has become Russia's largest importer and the sixth largest exporter. It can be said that China is Russia's NO.1 trade partner.

1.2. From the perspective of commodity structure

According to the “Standard International Trade Classification (Rev.4)”, the import and export commodities are classified into ten kinds, from SITC0 to SITC9. In this standard, products that classified into SITC0 ~ 4 are almost primary products; SITC5, SITC7 goods are capital-intensive or technology-intensive; SITC6, SITC8 commodities are mostly labor-intensive.

In general, the percentage of raw materials, finished goods, clothing, shoes, equipment and other miscellaneous goods accounted for more than 50% in the exports China to Russia. However, most of these commodities are labor-intensive goods with lower added value. It indicates that the products that China exports to Russia are in a backward structure.

At the same time, China's imports from Russia are mainly concentrated in SITC3, SITC 2, SITC6, SITC5, SITC0. Fossil fuel products are China’s most important imports, its share increase from 44.10%(2009) to 67.76%(2013).

Table 2. The percentage of China 's exports commodities to Russia from 2009 to2013(%)

SITC	2009	2010	2011	2012	2013
0	6.03	4.65	4.51	3.98	3.84
1	0.10	0.07	0.07	0.06	0.05
2	0.47	0.48	0.64	0.48	0.35
3	0.51	0.75	0.90	0.67	0.58
4	0.01	0.01	0.01	0.01	0.01
5	5.82	5.24	5.33	5.10	5.06
6	18.59	18.61	19.28	19.29	18.79
7	31.05	35.34	38.11	39.81	35.32
8	37.37	34.84	31.10	30.60	36.00
9	0.05	0.02	0.04	0.00	0.00

Source: [1]

In this comprehensive comparison, it is obvious that both countries’ import and export commodity has a single structure, which means it is concentrated in one or two categories of goods. Besides, the

majority of these commodities are primary products and labor-intensive products, which makes the structure backward. Furthermore, the two economies are highly complementary, and the economic and trade cooperation has great potential and bright future.

2. Cultural differences and the negative effects.

2.1. Difference in views and value

Under the influence of the traditional Confucianism, the Chinese people have formed the idea of moderation, pragmatism, altruism and peace. Although the time concept of Chinese is weak, the Russians' is even worse. They may come to a meeting 10 minutes later than the scheduled time, even later.

Ingrained culture is embodied in every individual person. When cultural differences lead to cultural conflict, the unpleasant situation often shows up in trade cooperation. In particular, some Russians may have the traditional concept called "China threat" during the business with Chinese. Therefore, Far East region of Russia is difficult to attract China manpower and resources, which hinders the further development of bilateral economic and trade cooperation.

2.2. The way of thinking and language barriers lead to cognitive bias

The way of thinking and language difference has been one of the obstacles that can't be avoided in Sino-Russian economic and trade cooperation. This is most directly reflected in business negotiations. The Chinese way of thinking is comprehensive and regard the whole as priority. That is to say, the Chinese pay attention to the integrity, relevance, and always stick to the general corresponding principle before they discuss specific terms and details. However, Russians have analytical thinking. They pay great attention to the demonstration and analysis, and through the induction, deductive derivation. They emphasize the details of the contract. In this way, such differences often lead to negotiations deadlocked. The differences in the way of thinking, language, legal ideas and even religious beliefs will bring about the misunderstanding of the law of other countries. Unnecessary misunderstanding and cognitive bias, often make the Chinese in Russia be in a dilemma. Such as the "Gray Customs Clearance" incident, it not only reflects the Russian market mechanism is not perfect, but also reflects the two people' different awareness of the law. As a result,

professionals in language and law are eagerly needed in the field of trade cooperation.

2.3. Customs differences

Taboo is an important content in customs. Cultural differences and taboos are the inevitable problems of cultural communication between countries. In the negotiation process, we must pay attention to avoid the other taboo, so as not to stimulate and even hurt each other's feelings. For example, the Russians believe that we should use right hands to handshake because left is not auspicious. When Russians pass the cigarette to others, they give the whole box instead of a single one. In addition, they regard it impolite to light three cigarettes of different persons with the same match. When you speak, you can't point with your fingers. For some Russians, "OK" gestures are not polite. However, as long as we follow the principle of mutual respect and mutual understanding, it is not so hard to avoid conflict.

3. How to deal with cultural differences in Sino-Russian economic and trade cooperation

3.1. Accept cultural differences, promote cultural communication in multi-channel

3.1.1. The government should promote cultural exchanges and give support in policy

When we look at the political exchanges between China and Russia in recent years, we can find out that both sides made greatest efforts to cultural exchanges. The most straightforward way to resolve cultural differences is to recognize the existence of differences and to understand each other's culture. In recent years, frequent visits between Chinese and Russian high-level leaders have been the best time to promote cultural exchanges between the two countries. The success of China-Russia "Country Year", "Language Year" and "Tourism Year" have also been fruitful in cultural exchanges between the two countries. In view of this, China should also use the Sino-Russian mutual "Tourism year" to increase the opportunities for mutual exchanges to strengthen cultural exchanges. In addition, there are already 12 Confucius Institutes in Russia, which is the best platform for Russian people to understand Chinese culture. We should strengthen the construction of Confucius Institutes, create conditions for the exchange of language and culture between the two countries, and enhance Russia's understanding of Chinese language and culture. In the same

time it should be encouraged for private cultural groups to visit each other, and to establish permanent institutions to boost the exchange of Sino-Russian culture.

3.1.2. Encourage private study abroad, travel and trade

Study abroad, travel and trade are always a specific way to understand each other's culture. The number of Chinese students studying in Russia is not as large as that to United Kingdom, the United States, Australia and other Western countries. In tourism, because of the geopolitical factors, tourism destinations of Russian people are concentrated in the three northeastern provinces and Beijing. While the number of Chinese people travel to South Korea, Japan, the United States, Britain, Greece and other European area a lot more than those to Russia. Therefore, the provinces and the relevant government departments with the geographical advantages should pay more attention to cooperate with Russia and increase publicity efforts to introduce eye-catching programs, so that there will be more concern and understanding about the Russian culture.

3.2. Train related personnel through multi-channel

In the field of the multinational enterprises operation in, high-quality professionals are needed to participate in Sino-Russian economic and trade cooperation, which requires our government to cultivate both professional knowledge and proficient in Russian language talent. There should be more courses about Russia in universities in geographically advantageous provinces. At the same time the Russian professional courses should be open to achieve the sharing of teaching resources to cultivate more compound talents students good at both Russian language and Russian law. Except the Russian researchers and university-related professional teachers, students, plenty of people who live in the border cities do not know about Russia, let alone understand the Russian culture. It's suggested that Russian forum, lectures can be regularly hold in conditional provinces and cities, in order to deepen people's understanding of Russia, to make up for cultural differences bringing misreading between the two countries. Also in the border cities and counties regularly Chinese and Russian fairs, cultural exhibitions can be held to create a mutual understanding atmosphere.

3.3. Cultivate cross-cultural awareness and look for new business opportunities

3.3.1. Use cultural differences as an opportunity to develop new market demand

China and Russia are adjacent, with hundreds of years of diplomatic and trade history. Both of them have a certain recognition to the culture of the other side. With deeper mutual understanding, the friendship between the two countries become better and better in recent years. On this basis, the cultural differences as an opportunity can become a new bright spot to find new market demand in Sino-Russian economic and trade cooperation. For example, we can work in the cultural creative industries, bringing opportunities in trade and cultural exchanges which is win-win. In the tourism open areas, especially in the border provinces and cities, the occasion of China and Russia "tourism year" should be made use of and develop the tourism resources to open up some of the Chinese culture to understand the theme of tourism projects, which attracts Russian tourists to China to understand Chinese culture. At the same time, the Chinese people can also in this way to understand the Russian culture.

3.3.2. Use cultural differences as an opportunity to create new products

The Chinese people never lack the inspiration for the creation of new products. Sino-Russian cultural differences have also long been known. If we blindly accommodate ourselves to each other, and always product the production to meet the need of other side, sometimes it will leave the old-school impression to others. Therefore, we can use the characteristics of Russian culture, while appropriate penetration of Chinese culture, and make the combination of differences between the two cultures. It will increase the novelty of the product to attract the attention of consumers.

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Трубакова Д.И.
**АЛГОРИТМ ФОРМИРОВАНИЯ СОЦИАЛЬНОГО
ИНТЕЛЛЕКТА В РАМКАХ ОБЩЕОБРАЗОВАТЕЛЬНОЙ
ОРГАНИЗАЦИИ**

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Аннотация: В статье рассматривается структура социального интеллекта, особенности внутривидовых компонентов данного феномена и особенности его формирования. Представлены ключевые этапы формирования социального интеллекта, а также основные принципы, обуславливающие результативность формирования исследуемого параметра.

Ключевые слова: социальный интеллект, эмоциональный интеллект, коммуникационные способности.

Социальный интеллект представляет собой одно из наиболее значимых для личности качеств, поскольку от уровня его сформированности зависит то, насколько эффективно будет социализация личности, ее включенность в пространство социальных взаимодействий. Это обуславливает значимость формирования социального интеллекта, в рамках всех социальных институтов, особенно – образования, что подтверждается исследованиями, в рамках философии образования, в частности в трудах Г. Гизеке [3].

Однако формирование социального интеллекта сопряжено с рядом трудностей, большинство из которых обусловлено множеством различных подходов к определению структуры социального интеллекта, отсутствием общего понимания феномена в научном сообществе. Примером обусловленной в данном контексте трудности, является сложность диагностики социального интеллекта и его компонентов, в силу чего автор считает необходимым выделять в структуре заявленного параметра только те компоненты, которые возможно изменить и выявить эмпирически.

Исходя из вышеописанного классификационного условия, можно выделить следующие параметры входящие в структуру социального интеллекта: коммуникационные способности, уровень коммуникационных и социальных представлений,

эмпатия, рефлексия, внимание, гибкость и устойчивость мышления. Все данные параметры можно диагностировать с помощью эффективных и валидных психодиагностических методик.

Так же, обоснованным является исследование личностных черт, исходя из возможностей инструментария опросника Кеттела, таких как открытость, аутоэмпатия, контактность личности. Тем самым можно представить структуру социального интеллекта, как совокупность когнитивного, личностного, эмоционального и коммуникационного компонентов, что соотносится со значимыми ориентациями социального интеллекта, представленными в исследованиях Дж. Гилфорда и У. Цайфберга [2].

Данные параметры описывают феномен социального интеллекта, учитывая большинство типологий, в том числе не делающих различий между социальным и эмоциональным интеллектом, в частности модели Дж. Аверилла [4].

Представленная автором структура социального интеллекта, позволяет определить наиболее оптимальный алгоритм формирования параметра, обусловленный особенностями формирования его компонентов, в качестве которого выступает простая восходящая иерархическая структура, состоящая из трех элементов/этапов. Этапы и иерархия обусловлены жесткой иерархией в структуре социального интеллекта, где развитие одних параметров, четко обусловлено развитием других.

1. Формирование коммуникационных способностей и коммуникационного компонента социального интеллекта. На данном этапе, значимым является не формирование коммуникационных способностей самих по себе, а осознанность и понимание самого процесса, со стороны учащегося. Коммуникационные способности обуславливают формирование коммуникационных и социальных представлений, т.е. параметра, который обуславливает восприятие личностью социальных взаимодействия как таковых [1]. Однако, для того, чтобы данная связь реализовалась в контексте развития адекватного восприятия социального взаимодействия, необходим целенаправленный подход к формированию коммуникационных способностей, как базового для социального интеллекта склярного компонента. Тем самым, начало формирования социального интеллекта важно

начинать с формирования коммуникационного компонента, как основы для развития всех остальных.

2. Формирование личностного и эмоционального компонентов социального интеллекта. На данном этапе, происходит формирование личностного и эмоционального компонентов в связке друг с другом. Их развитие происходит на основе хотя бы минимально сформированных коммуникационных способностей [1].

3. Формирование когнитивного компонента и устойчивой структуры социального интеллекта. Когнитивный компонент, т.е. коммуникационные и социальные представления, способность к прогнозированию и анализу социальных взаимодействий является апогеем и развития социального интеллекта, однако это возможно лишь при условии оптимальной структуры социального интеллекта, когда компоненты и ориентации социального интеллекта гармоничны [2]. Данный тезис можно доказать на примере статистического анализа данных, с использованием критерия Андерсона.

Исходя из модели этапов, развитие компонентов социального интеллекта будет осуществляться исходя из следующих принципов.

1. Модульно-интегральный принцип формирования способностей, принцип когнитивно-эмоционального перехода. Преобразование когнитивного содержания в эмоциональное и обратные трансформации дают возможность без лишних энергетических затрат решать интеллектуальные проблемы, социального интеллекта в данном случае успешно оперирует различными по свойствам и содержанию типами информации. Данный принцип позволяет реализовать скрытые связи между различными параметрами, способствовать их дальнейшему взаиморазвитию [1].

2. Принципы проблемного обучения. Проблемное обучение единственная на сегодняшний день форма развивающего обучения, которая применима к любым педагогическим условиям. Решение интеллектуальных задач всегда подразумевает проблему, которая решается в диалоге и при этом поддерживаются все высказывания учащегося, тем самым развивается коммуникационный компонент.

3. Принцип взаимовлияния родственных систем. В данном случае мы исходим из того, что влияние на одну из родственных систем окажет влияние и на другую. Данный принцип применим к нашему исследованию: развивая один параметр, либо компонент социального интеллекта, мы осуществим и развитие других параметров.

В качестве заключения стоит отметить, что использование четкой классификации структурных компонентов, системного подхода к пониманию социального интеллекта позволяет нивелировать большинство трудностей, связанных с формированием данного параметра.

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ПРОСТРАНСТВЕ:
НОВЫЕ ЦЕННОСТИ, ВЫЗОВЫ, ПЕРСПЕКТИВЫ**

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